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राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

एन सी ई आर टी
NCERT

NATIONAL ACHIEVEMENT SURVEY
CLASS V

2012

सर्व शिक्षा अभियान
सब पढ़ें सब बढ़ें

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ABBREVIATIONS

BAS	Baseline Achievement Survey
B.Ed	Bachelor of Education
BRC	Block Resource Centre
BPL	Below Poverty Line
CRC	Cluster Resource Centre
CTT	Classical Test Theory
DEME	Department of Educational Measurement and Evaluation
DI	Discrimination Index
DIET	District Institute of Education and Training
DISE	District Information System for Education
DRC	District Resource Centre
EVS	Environmental Studies
ETS	Educational Testing Service
GDP	Gross Domestic Product
HCF	Highest Common Factor
ICC	Item Characteristic Curve
ICT	Information and Communication Technology
IRT	Item Response Theory
LCM	Lowest Common Multiple
MAS	Mid-term Achievement Survey
M.Ed	Master in Education
MCQ	Multiple Choice Question
MHRD	Ministry of Human Resource Development
NAS	National Achievement Survey
NAEP	National Assessment of Educational Progress
NCERT	National Council for Educational Research and Training
NCF	National Curriculum Framework
NUEPA	National University of Educational Planning and Administration
OBC	Other Backward Classes
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
PPS	Probability proportional to size
PTA	Parent Teacher Association
SC	Scheduled Castes
SCERT	State Council for Educational Research and Training
SES	Socio-Economic Status
SIE	State Institute for Education
SRS	Simple Random Sampling
SSA	Sarva Shiksha Abhiyan
ST	Scheduled Tribes
TAS	Terminal Achievement Survey
TIMSS	Trends in International Mathematics and Science Studies
TLM	Teaching Learning Material
TRC	Teacher Resource Centres
UT	Union Territory
VEC	Village Education Committee

PREFACE

Sarva Shiksha Abhiyan (SSA), a flagship programme of the Government of India, provides a variety of inputs designed to ensure access, equity and quality in elementary education. As concerted efforts are made to achieve the objectives of SSA, it becomes important to gather information about what the children in schools know and can do at different stages of elementary education. In other words, an accurate measure of the learning achievement of children at different stages of education can provide important insights as to whether the inputs made into the elementary education system had a beneficial effect or not. Such evidence is provided by the National Achievement Surveys (NAS) carried out by NCERT every three years. This series of surveys not only provides policy makers, planners, curriculum developers and other practitioners with a 'snapshot' of what students have learnt in main subjects, but also provides a baseline against which changes in educational standards can be monitored.

The present survey is the third cycle of Class V in which the children's learning achievement has been measured in Language, Mathematics and Environmental Studies. This report is based on the data collected through standardized achievement tests administered to 122,543 students and through questionnaires from 6602 schools, 10851 teachers and 117,653 students from 31 States and Union Territories of the country.

This survey differs from those conducted previously in several important aspects. Most importantly, in this survey student responses to questions in the tests were analysed using modern Item Response Theory (IRT) rather than the classical techniques used in earlier surveys. As a result, all the scores in this report are located on standardised scales from

0-500. (Scores on earlier surveys were reported simply as the percentage of correct answers– a value which varies according to the tests takers.) This practice is consistent with that of major international surveys such as the Programme for International Student Assessment (PISA), Progress in International Reading Literacy Study (PIRLS) and Trends in International Mathematics and Science Studies (TIMSS).

This report presents the national picture of Class V students' learning achievement in three subject areas: Language (Reading Comprehension); Mathematics; and Environmental Studies (EVS). For each subject, findings are reported in two complementary chapters. The first summarises achievement results for the participating states and UTs. The second describes what students at different levels of achievement know and can do in that particular subject based on evidence from the test results.

In addition to measuring student achievement in main curricular areas, questionnaires were administered to students, teachers and school principals to collect information about a wide range of background variables that may have impact on learning. The data collected is summarised in this report giving an objective overview of the present situation. This information, together with the student results database, will be shared with states so that they can, in collaboration with NCERT, prepare state-specific reports and conduct further analysis for the benefit of states.

In conducting such surveys, the quality of data is of paramount importance. All efforts, therefore, have been made by the Department of Educational Measurement and Evaluation, NCERT to ensure quality in data collection, analysis and reporting. The Department has benefitted from the continuous support of the Technical Support Agency (TSA). The agency has helped us to improve the study and, as a result, has allowed us to report on student achievement following international patterns. I am grateful for the valuable inputs provided by TSA's team at NCERT and its international consultants.

EXECUTIVE SUMMARY

Introduction

National Achievement Surveys (NAS) are conducted under the Government's flagship programme *Sarva Shiksha Abhiyan* (SSA). NAS is designed to provide information about the learning achievement of students in the elementary sector of education in government and government-aided schools. This is achieved by administering standardized tests to students of Classes III, V and VIII. NAS also collects information about relevant background factors related to the school environment, instructional practices, the home backgrounds of students, teachers' qualification etc. NAS data gives policy makers, curriculum specialists, researchers and other stake holders a 'snapshot' of what students know and can do in key subjects at a particular point in time. The results also serve as a baseline against which future progress in education may be evaluated.

This report presents the findings of the third cycle of the national achievement survey of students studying in Class V conducted from November 2010 to March 2011. The subjects covered were Language (including Reading Comprehension), Mathematics, and Environmental Studies (EVS).

Methodology

Sample selection

Selecting a representative sample in India is a challenging yet critical part of the survey process. For Class V NAS, government and government-aided schools having Class V were included in the sample frame. The general selection procedure was:

- Selection of districts within a state (Probability Proportional to Size (PPS) sampling)
- Selection of schools (PPS within each selected district)
- Selection of students (randomly within selected schools)

This survey saw tests and questionnaires administered to a sample of 1,22,543 students, and 10851 teachers from 6,602 schools across 27 States and 4 Union Territories.

Tool development

For any large survey, the tools employed need to be accessible, valid and reliable. In order to measure reliably the achievement levels of class V students, tests in three subjects, viz. Language, Mathematics and Environmental Studies (EVS) were developed. In view of the wide variation in course content across the states, developing suitable tests was big challenge. The first step was to collect the syllabuses and the text books of Language, Mathematics and Environmental Studies from the states/UTs. These were then analysed from the point of view of the content areas covered and the competencies to be developed. In each subject, common core content and competencies were identified. Based on this analysis, subject-specific assessment frameworks were developed. These described the content areas and competencies to be covered and prescribed the number and type of items to be used for testing each domain. In order to provide sufficient information, three test forms were developed for each subject. For the Class V NAS, each test for EVS and Mathematics consisted of 40 multiple-choice items. Of these, 20 were common 'anchor items' which appeared in all test forms. Thus, overall 80 unique items were used in each subject to measure

learning achievement. Each Language test form consisted of 35 multiple-choice items with 20 serving as anchor items. Texts and items testing reading comprehension were used in direct translation in all states and UTs. Items testing language elements such as grammar were developed specifically for each language and were not used in translation. Finally, scoring keys were developed and checked for each test form in each subject.

Translation workshops were conducted in which invited experts translated the tests into 15 languages. Checks were undertaken to see that each item tallied with the items in the master tests in English. In this way, multiple test forms in Language, Mathematics and EVS were finalised in 15 languages for administration across the different states/UTs of India.

Test administration

NAS is conducted by the National Council of Educational Research and Training (NCERT). To coordinate the NAS project in the States/ UTs, NCERT takes the help of state agencies – notably SCERTs and SIEs. For the current survey, each participating state designated a State Coordinator who was responsible for implementing the NAS in their State/UT in accordance with NAS guidelines. State coordinators were given training on how to collect data in the field. For this a detailed training manual was developed by DEME. Thereafter, State Coordinators provided training to district coordinators about the conduct of main achievement survey. In each selected district, district coordinators appointed 10 to 12 teams of field investigators. Each team comprised two field investigators. They were given a rigorous training about selection of sections and students in the sampled schools, administration of tools and transfer of responses from test booklets to separate response sheets. These response sheets were collected by the district coordinators and then sent to the state coordinator after checking. These response sheets were dispatched by the state coordinator to the NCERT where they were scored and analyzed. State Coordinators and their teams are to be commended for their efforts. Without their help and professionalism, the massive task of data collection for the National Achievement Survey would not have been possible.

Use of IRT

In earlier two cycles of surveys, the data was analysed using Classical Test Theory (CTT) and average scores were reported as the 'proportion of answers correct'. However, this approach has significant limitations. To overcome these, data from the present Survey was analysed using Item Response Theory (IRT) in addition to the classical approach as is the practice of major international surveys. IRT uses a mathematical model to link a student's chance of success on a particular item to two main factors: the student's level of ability and the item's level of difficulty. In this model, the difficulty of an item does not depend on the group of test takers. This allows the use of multiple test booklets which can be linked. It also allows scores from tests used in different cycles to be compared - an essential characteristic for monitoring progress over time.

Throughout this report, results are reported using 'scale scores' calculated using IRT in place of the percentage correct scores. For this, the chosen scale is from 0 to 500. The average score for the whole population is initially set at 250. The standard deviation of the scale is initially set at 50 for the whole population. This means that the majority of students (about 70%) will have scores in the range 200 to 300. (See figure below.)

The Reporting Scale

| 100 | 200 | 300 | 400 |

Low achievement   Mid - point = 250   High achievement
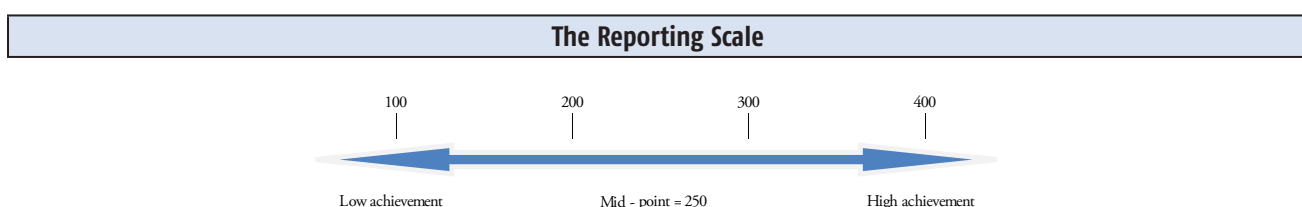
This executive summary presents the major findings of the survey about the achievement of Class V students in Language, Mathematics, and EVS. Selected background characteristics of schools, teachers and students are also reported. Regression analysis was used to see the impact of these background variables on student achievement.

Achievement in Language (Reading Comprehension)

The average Reading Comprehension achievement of students varied greatly across the states and UTs of India. There was a highly significant difference between outcomes in high scoring states such as Uttar Pradesh (282), Tamil Nadu (278) and Kerala (277), and low scoring states/UTs such as Puducherry (222), Bihar (228) and Chhattisgarh (229).

States also varied greatly in the range between their lowest and highest achieving students as revealed by their inter-quartile score ranges. Some States/UTs, e.g. Puducherry (39), Sikkim (44) and A & N Islands (51) had relatively homogeneous cohorts whilst in others students demonstrated far more diverse abilities e.g. Uttar Pradesh (93), Tamil Nadu (85) and Jharkhand (81).

Overall, no significant differences were detected in the average achievement of girls and boys. Similarly, no significant difference was detected between the achievement level of rural and urban students although exceptions were found in a small number of States/UTs. The survey did find that students from the General category outperformed their peers in the SC, ST and OBC categories by a statistically significant margin.

What Class V students know and can do in Reading Comprehension

In reading comprehension three cognitive processes were identified: locating information; grasping ideas and interpreting them; and, inferring and evaluating. Across this domain of Reading Comprehension, Class V students demonstrated a wide range of ability.

Students at the lower end of the scale (i.e. within 200 to 240 scale scores) could demonstrate all three cognitive processes – provided that the context was clear and the tasks non-complex. For example, they were able to use information from a table, to locate the time and the occurrence of a phenomenon, recognize a particular text type, and also make simple inferences.

Students performing in the intermediate range of the scale (say, 240 to 275 scale score) could do more. They could determine the causes, frequency, duration and sequence of events described in a variety of texts. They could also identify cause and effect relationships and make complex inferences about the qualities of characters from their actions.

Students performing at higher end of the scale (i.e. those with scale scores above 275) could do more. In addition, they could identify the main theme of a given passage. They could also identify the relationship between events, ideas and phenomena, and recognize the likely thoughts of characters in the text.

It was also seen what the majority of students could do in Reading Comprehension. On an average about half of the students could locate information from the given text, make inference about the cause of an act or event and were able to draw simple conclusion about the usefulness of an object. More than 60% students in the country could gather information from a given table about a particular event and could recognize the text type as a notice. On the other hand only one third of students were able to identify the main theme and evaluate the title of a given passage.

Achievement in Mathematics

The results show that the average mathematical achievement of students varied greatly across the states and UTs. Great differences were observed in outcomes in the group of high scoring states such as Uttar Pradesh (298) Tamil Nadu (279) and Karnataka (269) and the low scoring states/UTs such as Puducherry (217), Andaman & Nicobar Islands (226) and Chandigarh (226).

States also varied greatly in the range between their lowest and highest achieving students as revealed by their inter-quartile score ranges. Some states/UTs, e.g. Chandigarh (36), Andaman & Nicobar Islands (37) and Puducherry (40) had relatively homogeneous cohorts whilst others had students far more diverse in achievement e.g. Uttar Pradesh (85), Tamil Nadu (84) and Karnataka (81).

Overall, no significant difference was found in the average achievement of girls and boys in Mathematics. Some readers may be surprised by this finding. However, the large sample size (>55,000) and the consistency of this finding across states suggest that this is a robust conclusion. Similarly, with a few exceptions, no significant difference was detected between the average achievement level in Mathematics of rural and urban students. Data from the survey indicated that students from the General category outperformed their peers in the SC, ST and OBC categories by a statistically significant margin.

What Class V students know and can do in Mathematics

Class V students demonstrated a wide range of abilities in the domain of Mathematics.

Students performing at the lower end of the ability scale, (i.e. within the range 175 to 230 scale scores) could demonstrate basic mathematical knowledge e.g. they knew the place value of digits in the number system and could recognise geometrical shapes. They could also apply fundamental concepts and perform basic operations in simple situations.

Students performing in the intermediate range (i.e. those with scale scores of, say, 230 to 275) could do more. They could perform a wider range of mathematical operations including multiplication and division; work competently with basic units; and, apply their knowledge to a range of problems set in authentic contexts (e.g. money calculations in the market) provided that the context was clear.

Students performing at higher end of the scale, (i.e. those with scale scores above, say, 275) could do still more. In addition, they could apply most or all of the mathematical operations required by the curriculum; demonstrate understanding of fractions; add decimal fractions; work confidently in a range of units including those of area; and solve more complex problems involving time and money calculations - even when these were set in less familiar contexts.

In order to find out what majority of students could do in different areas of Mathematics, the percentage correct on each item was calculated. It was seen that more than 70% students could count the sides of a given figure and identify the largest angle among the given angles in a geometrical figure. About 60% of students could solve simple problems of basic operations and measurement and could find out the multiplier of a given numbers. However, only one third of students could compute the difference between two decimal numbers and only 22% students could do word problems based on memory.

Achievement in Environmental Studies

The average achievement of Class V students in Environmental Studies varied greatly across the participating states and UTs. Highly significant differences were seen between outcomes in high scoring states such as Tamil Nadu (288), Uttar Pradesh (284) and Karnataka (275) and low scoring states/UTs such as Puducherry (222), Chandigarh (226) and Haryana (232).

Inter-quartile score ranges also varied greatly across the states. Some states/UTs, e.g. Chandigarh (38), Puducherry (43) and Sikkim (44), had relatively homogeneous group of students in terms of ability whilst others showed far more diversity e.g. Uttar Pradesh (89), Karnataka (84) and Madhya Pradesh (83).

Overall no significant differences were detected in the average achievement of girls and boys. Similarly, no significant difference was detected between the achievement level of rural and urban students although exceptions were found in a small number of states/UTs. The survey did show that, as in the other subjects tested, students from the General category outperformed their peers in the SC, ST and OBC categories by a statistically significant margin.

What Class V students know and can do in Environmental Studies

The items of the EVS test booklets were designed to assess three cognitive processes or 'skills': knowing, applying, and reasoning.

From the EVS item map it was seen that students at the lower end of the scale (say, 170 to 225) could demonstrate, albeit to a limited extent, all three cognitive processes. For example, they could use information from a table and locate places and directions on a map. They could also classify animals and plants on the basis of their characteristics.

Students performing in the intermediate range of ability (say, scores of 225 to 275) could do more. They could analyze issues, interpret information, establish relationships, relate information, and find solutions in different situations. They could also identify cause and effect relationships and make inferences in various situations.

Students performing at higher end of the scale (i.e. those with scores above 275) could do more. In addition, they could explain the components of diet and their functions, identify sources of energy and their by products, and demonstrate understanding of the importance of the natural environment to human life. They could also explain observed phenomena in terms of physical processes.

It was found that in the cognitive process of 'knowing', more than three-quarters of students could identify the name of flightless birds and knew about amphibians and the spread of disease by mosquitoes.

In the process of 'applying' about 75% students could classify the animals into groups identify the footprints of birds, work out that salt can dissolve in water and about 60% understood that motor driven vehicles caused pollution. Only one third of students knew about the source of energy which produces carbon dioxide.

In the process of 'reasoning' nearly three-quarters of students could interpret a given weather graph and more than 50% could reason out that paint dissolves in kerosene, why the Earth looks blue from the outer space and that overpopulation is the main cause of unemployment and housing problems in India. However, only one third of students could explain the benefits of forests.

School-related Variables

The survey collected information about the school environment in four categories - School Background, Home-School Interaction, Teaching Learning Process, and School Social Climate.

School Background

Overall, approximately 70% of the schools surveyed were managed by State Governments, 83% were rural, 67% had a pre-school attached, 68% schools were inspected, and 73% followed a six-day week. However, in these as in other variables, there was wide variation amongst the states and UTs surveyed.

The majority of schools reported having no or few vacancies to fill. In states such as Punjab, Orissa, Jammu and Kashmir, and Assam, there were more vacancies and schools found these difficult to fill.

In the vast majority of the schools sampled, basic facilities such as playgrounds and safe drinking water are in place. Similarly, basic teaching materials and library books are available in more than 90% of schools. However, computers and musical instruments are less common being available in about 50% of schools only.

The survey showed that the mid-day meal scheme was functioning in more than 90% of schools, free uniform in about 50% of schools, and the free textbooks scheme in 95% of schools for students of all social categories.

Home-school Interaction

The Home-school interaction category represented those variables which were jointly influenced by both home and school factors. Overall, more than 90% of the schools asked parent to attend special events, to ensure that the child completed his/her homework, and to serve on school committee but only 49% of schools asked parent to raise funds for the school. About 40% schools rated parents' support as medium.

The participation of the Village Education Committee (VEC) and the Parent Teacher Association (PTA) were available in majority of the schools (95% and 82% respectively).

More than 50% of the schools rated teachers' job satisfaction, teachers' understanding of the curricular goals, teachers' degree of success in implementing the curricula and teachers' expectation of student achievement as high. Also 47% of the schools rated student desire to do well as high.

Teaching Learning Process

Grouping of classes and availability of various kinds of instructional materials were considered under this variable. It was found that in more than 78% of the schools, the students' were grouped on the basis of ability in EVS and in Mathematics and that the level of achievement was significantly higher in such schools.

In about 85% of the schools enrichment as well as a remedial programmes in EVS and in Mathematics were in place. Such programmes were found to have a positive effect on the achievement of the schools.

The survey also disclosed that 99% of the schools had textbooks in all the subjects, and more than 80% had workbooks and teacher handbooks available. Teaching learning material was available in more than 96% of the

sampled schools. All these had positive impact on the learning of different subjects. However, science laboratory, access to internet, and ICT facilities were not available in more than 70% schools.

Social Climate of School

School climate influences the behaviour of both teachers and students. Under this, behavioural problems of students were studied. The analysis revealed that overall the social climate in schools was good as very few schools reported any problematic behaviours by students. For example, late arrival to school in 66% and absenteeism in 59% schools was rarely seen. Skipping classes, indulging in cheating, and disturbing the classroom decorum were never observed in 53% to 64% of the schools. Students using profanity, indulgence in vandalism and activities of theft were never observed 68% to 77% schools. Causing physical injuries to other students was never observed in 60% of the schools and intimidation/verbal abuse or physical injuries to teachers were never experienced by majority of schools (more than 88%).

When the impact of school variables was seen on student achievement, it was found at that the factors like equipment, school governance, availability of help in ICT schools having more middle income group students, schools which involve parents, pupil desire to do well etc., have a positive effect on attainment whereas internet access, attachment of pre school with the main school, problem behaviour of students and schools having more disadvantage students have shown negative impact.

Students -related Variables

Student Background

Overall 49% boys and 51% girls participated in this survey. About 66% students were 10-11 years old. From among the sampled students there were 21% SC, 17% ST, 34% OBC and 25% other categories students. Nearly 70% students spoke the same language at home as the one used in the school as medium of instruction. On an average nearly half of the students had three or more siblings. In this survey only 6% students belonged to physically challenged group.

Parents of about 2/3rd students had the educational status from literate/primary to higher secondary. Nearly 1/3rd students reported that their parents were agricultural labourer/daily wagers or street vendor. Further, it was found that in the sampled schools nearly half of the students belonged to below poverty line families, i.e. BPL card holders. It was also observed that the students belonging to BPL card holder families could not do as well as the other students in all the three subjects. The data indicated that the educational status of parents had positive impact on their wards' achievement.

Availability of Resources at Home

The survey showed that less than half (30% - 47%) students had literary resources such as daily newspaper, dictionary, calculator, books other than course books and study desk available at home.

About 60% students received help from their family members and 44% from their tutor. Approximately, 30% students took private tuitions. The highest percentage of students taking tuitions (83%) was seen in West Bengal. Almost all the students (97%) reported having textbooks for all three subjects.

Availability of Educational Resources at School

As far as the availability of educational resources is concerned, 44% students reported that computers were available in their schools but 55% students said they never used the computers. Similarly, availability of library in the school did not ensure that the students would use the library. For example in Sikkim 71% students reported that their schools had library but 61% said that they never used it.

Teaching Learning Process

Students reported about the frequency of home work in different subjects. On an average in Language 72 %, in Mathematics 44%, and in EVS only 57% students reported that they were given homework daily.

The largest percentage of students (56%) reported liking language as a subject followed by Mathematics (30%) and EVS (14%). Almost 90 % students liked to be in school.

Activities Outside School

For the overall development of students, activities outside the school are important. When asked about various activities it was found that nearly 67% students watched TV, 79% interacted with their friends, and 83% played games/sports, 82% did the homework given at school and 33% read books for enjoyment. Further 71% students reported that they looked after their family members, 63% helped in cleaning the house and 33% helped in preparing food daily.

Teacher-related Variables

In this survey information was collected from the teachers under four heads – teacher background, teacher training, teaching learning process, and teachers' opinion about the school.

Teacher Background

A total of 10851 teachers filled the Teacher Questionnaire. Out of these, there were 55% male and 45% female teachers. In contrast to this in Delhi the female teachers were 86% while male teachers were only 14%. Majority of the teachers were between 31 to 51 years of age. Most of the teachers, i.e. 63% were graduates or post graduates, 23 % qualified at higher secondary and only 13% teachers were qualified at secondary level or below. About two third of the teachers in Chandigarh were postgraduates whereas in Gujarat 54% teachers were qualified only at the middle level.

Overall 79% teachers were regular teachers and 12 % were para teachers in the surveyed schools. But in Chhattisgarh the percentage of para teachers was 82 %.

Teacher Training

65% teachers were primary/elementary teaching certificate or diploma holders. There was a lot of variation among the states regarding the professional qualification of the teachers. Highest number of teachers with master's degree in professional qualifications were in Jammu and Kashmir state.

Of the sampled teachers, 82% had attended 1-5 in-service training programmes. However, in Haryana and Meghalaya around 50 % Teachers had not attended any in-service training program. In most of the states maximum training programs were organized by school complex, CRC and BRC. In Meghalaya DIET/DRC were more active in providing in service training programs.

Teaching Learning Process

Among the sampled teachers, 85% teachers gave homework regularly. Besides, it was seen that 83 % teachers maintained Teacher's Diary to keep a record of their day to day activities planned and executed in the class. Such a record helps teachers as well as supervisors to know what teachers did on a particular day in a period in a class.

As far as Teaching Support Material is concerned, it was found that 84% teachers had Teacher's Handbook, 93% teachers had TLM, 39% teachers had Audio-Video facilities and 75% had received TLM Grant. In Kerala and Daman & Diu all teachers had Teaching Learning Material. In Andhra Pradesh, Haryana and Kerala Audio-Video facilities were available to less than 3% teachers. Overall 41 % teachers reported that they had received the academic support 1-5 times in the academic year 2009-2010.

Regarding teacher interaction with each other, it was found that more than 40% teachers interacted with each other 2-3 times a week regarding how to teach a particular concept or preparation of instructional material and also visited another teacher's classroom to observe his/her teaching 1-3 times per week.

When asked about the problems in schools, more than 65% teachers in West Bengal responded that overcrowded classes were a serious problem. Overall only 15% teachers reported not having adequate workspace outside their classroom as a serious problem. 50% teachers considered non-availability of materials for conducting experiments as a minor problem.

In order to know the status of revised text books on the basis of National Curriculum Framework (NCF)-2005 in the states, the teachers were asked whether they used the revised text books based on the NCF-2005 for Class V. Their responses indicated those revised textbooks based on NCF-2005 were being used by almost all the teachers in Language, Mathematics and Environmental Studies (EVS).

Overall 38% teachers had attended a training programme based on NCF-2005. In Uttarakhand 75% teachers had attended NCF-2005 based training programmes and in Jharkhand, Maharashtra and Uttar Pradesh nearly 62% teachers attended the training programmes based on NCF-2005.

Teachers' Opinion about School-related Factors

Teachers opinions were sought on various school related factors. More than 50% teachers reported that the teachers were highly satisfied with their job, teachers' degree of success in implementing curriculum was high, and that students wanted to do well in their schools. 47% teachers reported the teacher's expectations from their students, and students' regard for school property was high. However, more than 40% teachers reported that the parental support and their involvement in school activities were low.

Regression Analysis: Summary of Findings

The table which follows summarises the outcomes of the regression analyses described in chapters 8, 9 and 10. The factors listed appear to have a robust effect on attainment in different subjects in the sense that the relationship is statistically significant and is not extinguished by allowing for key variables including home resources and speaking the language of instruction at home.

	Student-related factors	School-related factors	Teacher-related factors
Factors associated with a positive effect on attainment	Having a subject textbook Positive attitude to learning Help in studies Homework checked at school Homework checked at home Reading out of school Watching TV Hanging out with friends Discussing school at home Mode of transport to school	Equipment School governance Student:computer ratio Help in ICT Middle income School involves parents Pupils desire to do well Teacher peer review.	Years of teaching at the current school Keeping teacher's diary Range of activities in the classroom Teacher's handbook Audio-Visual facilities
Factors associated with a negative effect on attainment	Number of siblings Being physically challenged Working with the computer	Disadvantaged pupils Problem behaviour Pre-school attached Internet access	Para teachers, shiksha karmi, etc. Severe problems with facilities Receipt of TLM grant

Limitations

This survey undoubtedly represents a significant step forward in the development of national achievement surveys in India. However, as with all such enterprises, lessons have been learnt. In conducting the Class V NAS, the following limitations have been noted so that they may be addressed in future achievement surveys:

- The survey used DISE 2007–08 data from the National University of Educational Planning and Administration (NUEPA) as the primary sample frame. Once in the field, significant discrepancies between the DISE data and actual school enrolments were noticed.

- In some states, sampled schools were changed by the state personnel because of disturbances in states due to various reasons. Hence, the data collected in such states may not be as representative as initially planned.

- Due to discrepancies in the sample frame, deviation from agreed sampling procedures, and loss of information during administration, it was not possible to estimate sample weights for the survey.

- In the states of Jharkhand, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal, the tests had to be administered at the beginning of class VI rather than at the end of class V due to administrative reasons.

- In most of the states, responsibility for data collection was given to DIET faculty who, in turn, used their students as field investigators. On reflection, the training and hands-on practice given to these field investigators may not have been sufficient resulting in inefficiencies in the data collection procedure and, hence, increased demands during the data cleaning process.

- In order to meet the key objectives of this survey, schools and students were sampled in a systematic fashion. This meant that teachers could not be explicitly sampled in the same way. As a result, the analysis of teacher-related variables vis-à-vis student attainment could not be made in a comprehensive manner.

- In past surveys, the CTT model was used for developing tests and analysing the results. In this survey, IRT was used. These two methodologies are quite different. Therefore, the results of this survey are not directly comparable with those of past surveys.

- For the first time, NCERT used IRT for analysis of results instead of CTT. Therefore, results are reported in terms of scale scores rather than percentage correct scores. Whilst this is an important step towards emulating international best practice, unfamiliarity with this approach has undoubtedly made it more difficult for the lay reader to interpret results. It is hoped that as IRT becomes more widely used in India, understanding will improve.

Chapter 1

Introduction

CHAPTER 1 INTRODUCTION

This report summarises the findings of the National Achievement Survey (NAS) of class V students conducted in 2010 by the National Council for Educational Research and Training (NCERT) through its Department of Educational Measurement and Evaluation (DEME). It is based on information gathered through tests and questionnaires administered to a sample comprising 1,22,543 students in 6,602 schools across 31 States and Union Territories (UTs). The subjects covered were Mathematics, Language (including Reading Comprehension) and Environmental Studies (EVS).

This survey is the latest in an ongoing programme of such studies available to all 35 States and UTs of the nation. The aim of each NAS is to provide reliable information on the achievement of students in the elementary sector of education in government and government-aided schools. This is achieved not only by applying standardised tests to students, but also collecting information about relevant background factors including the school environment, instructional practices, qualification and experience of teachers, and the home background of students. The data from each NAS gives policy makers, curriculum specialists, researchers and, most importantly, school principals and teachers a 'snapshot' of what students are achieving in key subjects at a particular point in time. By repeating such measurements at regular intervals, trends can be explored providing an invaluable perspective from which to consider educational reform and improvement.

It should be noted that whilst each NAS provides achievement scores for the nation, for each participating state and for certain groups (e.g. females, students in rural schools, etc.), it does not give scores to individual students or schools.

1.1 History of NAS in India

In the year 2000, the programme of NAS, originally conceived by NCERT as an independent project, was incorporated into the Government's flagship project Sarva Shiksha Abhiyan (SSA). NCERT is responsible for developing and conducting the surveys whilst funding is provided by the Ministry of Human Resource Development (MHRD).

Under SSA, three cycles of NAS were planned. Each cycle was to cover three key grades: class III, class V and class VII/VIII. The first cycle conducted in the period 2001-04 was named the Baseline Achievement Survey (BAS). The second cycle, conducted during 2005-08 was the Mid-term Achievement Survey (MAS). The third planned cycle was originally named the Terminal Achievement Survey (TAS). However, the importance of these surveys and the experience gained through the first two cycles made it clear that this programme should be an ongoing feature of the national education system. Therefore, the current series of NAS is more correctly known as 'Cycle 3' as given in the Table 1.1 below:

Table 1.1: Timeline for NAS under SSA											
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Cycle 1 (formerly BAS)				Cycle 2 (formerly MAS)				Cycle 3 (NAS)			
Class V		Class III		Class V		Class III		*Class V		Class III	
	Class VII & VIII					Class VII & VIII			Class VIII**		

* The findings of the Cycle 3, Class V (NAS) are reported herein. **Cycle 3 (NAS) for Class VIII is in progress while Class III has been initiated.

At the class III level, assessment is made in two subjects, i.e., Mathematics and Language. For class V, assessment is carried in three subjects: Mathematics, Language and EVS. For class VII/VIII, four subjects are assessed, i.e., Mathematics, Language, Science and Social Science.

The comprehensiveness and coverage of these surveys provide very useful data to capture the progress of the education system as well as to enhance the quality of elementary education.

The survey reported herein represented a quantum leap forward in the methods used to analyse the results. NCERT's belief that these surveys should be an ongoing feature of the national education system encouraged the project to introduce a new method of scoring the test results, namely Item Response Theory (IRT) (see 1.9 below). This offers the exciting possibility of linking and thus comparing national and state test scores over time, even though different tests are used. This requires a survey design which specifies some repetition of items between the tests to be linked, and that sampling and weighting details should be comparable. IRT methods are described in more mathematical detail in Appendix II.

1.2 Development of Tools

For any large survey, the tools employed need to be simple, understandable, valid and reliable. For measuring reliably the learning levels of class EVS are important. The tests need to be pegged at the level that they measure the abilities developed in children across the states. In view of variation in course content and other factors, developing tests is a big challenge. Therefore, before undertaking the test development, it was necessary to know what was taught at class V level by different states in different subjects. The first exercise, hence, was to collect the syllabuses and the textbooks of Language, Mathematics and EVS from the states/UTs. These were then analysed from the point of view of the content areas covered and competencies acquired. The common core content and competencies were identified for developing the tests.

Based on the analysis, assessment frameworks were developed in each subject. The frameworks described the competencies to be covered in the tests, the number and type of items to be used for testing each competency, the structure of the test forms and number of tests forms to be used.

For measuring each learning outcome with sufficient precision, it was necessary to construct multiple test forms in each subject. A three dimensional grid was prepared in each subject indicating the content areas to be covered, skills to be tested, the difficulty level of items under each skill along with the number of items.

Item writing workshop

General

The item writing workshop included plenary sessions on fundamental principles of test development and subject-specific workshops for writing and reviewing/editing draft items.

The general principles covered were:

- Characteristics of sample-based achievement surveys (national and international)
- Test specifications and their role in test development
- Item writing rules and guidelines

■ Procedures and checklists for reviewing the quality of items

■ Introduction to classical item statistics.

1.2.1 Language

There were two sub-groups – English and Hindi. The work was guided by the draft specifications for the language test prepared by DEME, text and item types from MAS and international examples from various sources including National Assessment of Educational Progress (NAEP) reading. The tasks covered were:

■ Reading texts and questions (4-option mcq)

■ Error correction (3-option mcq)

■ Discrete items on 'language structures' (4-option mcq)

■ Writing tasks and scoring criteria

The Hindi group checked that the English reading passages could be translated. They also produced an original Hindi reading passage for translation into English.

Sufficient passages, discrete items and writing tasks were prepared and reviewed to create three booklets for pre-testing having the following structures:

Booklet 1	Booklet 2	Booklet 3
Reading passage 1 (New)	Reading passage 4 (New)	Reading passage 7 (New)
Reading passage 2 (New)	Reading passage 5 (New)	Reading passage 8 (New)
Reading passage 3 (New)	Reading passage 6 (New)	Reading passage 9 (New)
Language structure block 1 (5 items)	Language structure block 6 (5 items)	Language structure block 11 (5 items)
Language structure block 2 (5 items)	Language structure block 7 (5 items)	Language structure block 12 (5 items)
Language structure block 3 (5 items)	Language structure block 8 (5 items)	Language structure block 13 (5 items)
Language structure block 4 (5 items)	Language structure block 9 (5 items)	Language structure block 14 (5 items)
Language structure block 5 (5 items)	Language structure block 9 (5 items)	Language structure block 15 (5 items)
Writing task 1 (letter)	Writing task 2 (narrative/creative)	Writing task 3 (descriptive)

The next steps undertaken were:

■ Entering all items, reading passages, marking keys etc. into the computer and checking.

■ Preparing artwork for reading passages.

■ Translating English reading tasks to Hindi and vice versa.

■ Selecting the passages and items for three booklets for pre-testing.

■ Reviewing, checking and proofreading all booklets.

■ Forming the Hindi pre-test booklets from translated reading items, translating writing tasks and original Hindi language structure multiple-choice questions.

■ Checking again before 'passing for print' to ensure that the English and Hindi versions were 'camera-ready'.

1.2.2 Mathematics

The work was guided by the draft specifications for the Mathematics test prepared by NCERT, items from MAS and international examples from various sources [(including NAEP and Trends in International Mathematics and Science Studies (TIMSS)], and traditional and modern textbooks used in schools for Mathematics.

Review of the textbooks immediately revealed that the approach to teaching/learning Mathematics advocated by the National Curriculum Framework (NCF) 2005 is significantly different from that of traditional syllabuses. There is a significant shift from formally setting out concepts and procedures to be learnt to an informal approach where topics related to Mathematics were discussed and explored through activities – rather than simply being presented from authority and then practised. This is obvious from the new textbooks which are significantly different in terms of content, complexity, language and even presentation.

The child-friendly approach used here was in sharp contrast to the more formal approach used in traditional books. The lack of formal mathematical language which is a feature not only of the old textbooks but also the test items used in MAS for class V was also noted.

The Working Group ran a simple analysis to check the extent to which the Mathematics test used for MAS is covered by the textbook for the new curriculum ('Math-Magic', NCERT 2008). This analysis showed that more than half of the 40 items used for MAS would not formally have been covered by students taught using this new textbook. There were some topics which, according to the NCF and the textbook, were not taught at class V. These include Highest Common Factor (HCF), Lowest Common Multiple (LCM), operations with decimals, types of triangles (acute, obtuse), meaning and calculation of average, percentages, and symbols </> (more/less). This would make the MAS test unfair for these students. Because of this, new tests for NAS, Cycle 3 were developed.

Activities carried out in Mathematics Group

- The Working Group came to a common understanding of the main principles of item writing and quality control.
- The Working Group drafted more than 100 items.
- All these items were peer reviewed.
- The Working Group proposed the use of the following classification system for Mathematics topics:

    T1: Number System

    T2: Computations (operations)

    T3: Measurement

    T4: Geometry

1.2.3 Environmental Studies

The work was guided by the draft specifications for the EVS test prepared by the department, items from MAS and international examples from various sources (including NAEP), and traditional and modern textbooks used in schools for EVS.

Prior to the seminar, DEME collected syllabuses and other information from the states. Not all states responded, but from those that did, a very complicated picture emerged.

In EVS, as in Mathematics, the approach advocated by NCF 2005 is significantly different from that of traditional syllabuses. There is a significant shift from setting out a body of knowledge to be learnt to a less prescriptive approach where topics are discussed with students rather than simply being presented as correct. This is reflected in the new textbooks which are significantly different in terms of content, complexity, language and even presentation.

The uptake of new syllabuses and materials has not been universal. Some states have adopted syllabuses and textbooks true to NCF whilst others have chosen not to make the transition. Even in states where new syllabuses have been developed, many schools continue to use old textbooks and, one suspects, traditional approaches.

This situation poses significant challenges for the development of EVS test booklets for the achievement survey. It was to decide whether the items be based on the old syllabus, the new syllabus, or something in between. What about the anchor items from MAS? Will these be equally appropriate in all states? Should anchor items that do not appear in NCF be deleted from TAS or not?

Given this dilemma, the EVS subject group worked hard to generate items targeting fundamental concepts and principles of EVS. The focus was on what was important both for the students and for the achievement survey.

The group developed a number of items designed to test 'enabling skills' such as reading information from a graph, bar chart or table. Items targeting the skill of inference from unfamiliar, given information were also developed. For achievers at the lower end of the ability spectrum, several items based on pictorial information were developed to lower the reading load. For example, some items provide four pictures showing a procedure and the child is asked to put them in the correct order. Some questions were based on the science of everyday situations, e.g., an item involving the evaporation of liquid from an open dish was designed to test children's understanding of the underlying principle, i.e., 'where has the water gone?'.

All draft items were reviewed by the whole group to ensure that major concerns were heard and that a consensus could be reached on the suitability of each item. In this way, more than 140 items were drafted covering all the major themes of EVS.

After the development of the items in EVS, the DEME faculty carried out the following activities:

- Entered all items, prepared marking keys etc. into the computer.
- Prepared artwork (maps, diagrams, charts, tables etc.) for items.
- Selected the items for three booklets for pre-testing.
- Reviewed, checked and did proof reading of the booklets.
- Translated the English versions to Hindi and checked that the translations were valid.
- Checked again before 'passing for print' to ensure that the English and Hindi versions were 'camera-ready'.

1.2.4 Translation of items

NCERT arranged a workshop for the translation of all items for pre-testing into 13 languages to be used in the survey. One person in each subject area was invited from each state to do this work. In a subsequent workshop, representatives of the states reviewed the translated items vis-à-vis English/Hindi items and made required corrections and modifications. Finally, in a training programme for administration of the assessment tools, state coordinators revisited all items selected for piloting and, where necessary, improved them.

The items were received using certain parameters like what subject matter is being tested; which cognitive behaviour is being exhibited in answering the question; is the key indisputably correct; is the task clean and the distractions plausible; is the language used of the level of the Class V students; and finally, are the items likely to be biased against any particular gender or ethnic group.

1.2.5 Piloting of the test items

In order to standardise the tests, they were piloted in 21 states to see how the items worked in different languages. The difficulty level (p-value) and discrimination index (DI) were computed using specialist software for each item. Item Characteristic Curves (ICC) were prepared and were carefully scrutinised to select suitable items for the final tests. By and large, the items having difficulty indices (p-values) between 0.2 and 0.8 were selected.

1.2.6 Sampling for piloting

The sampling procedure for the piloting of items was discussed. Given the time constraints and the need to gather meaningful data, the following procedures were used:

1. A sampling strategy was developed based on District Information System for Education (DISE) data for the school year 2007-08.

2. The sample would not be random, but based on expert judgement taking into account the statistical requirement of having enough records for each item for analysis and at the same time, diversity of the students/schools in the education system.

3. Each item should be answered at least by 500 students for classical item analysis. As teach language version was considered a new item, so we needed 500 students per language version per item.

4. Each item appeared in only one booklet.

5. All students in a selected class participated in piloting where booklets in different subjects were more or less equally distributed among them.

6. Schools in the state were selected taking into account the diversity of socio-economic background variables, i.e., some schools were selected from cities, some from small towns, some from rural areas, etc. (Since the expected number of students in rural schools is smaller than in urban schools, the overall number of selected rural schools was greater than urban schools.)

7. All the three booklets in each subject were tested in all languages. However, in one state, only one medium was used.

8. 225 students per district were selected (Hindi and English versions) with similar numbers achieved in other languages.

1.2.7 Administration of tests for piloting

- For piloting, DEME developed a handbook for district coordinators and test administrators.
- Coordinators were trained in the required procedures.
- Lists of selected schools were prepared for selected districts.
- Field investigators were instructed as to how to administer tests in schools.
- Field investigators visited each school on two successive days so that selected students could take tests in all three subjects.

- Student responses were transferred to data sheets by the field investigators after the completion of test administration. Data sheets were received by NCERT through state coordinators.

1.2.8 Data analysis

- Data entry was carried out by a private agency, but the quality of the data entry was controlled by NCERT.
- Data was analysed by the psychometricians from Educational Testing Service (ETS). Their main task was to analyse data from the piloting exercise, including a trial application of IRT to the data for tests.
- Data files from the piloting were analysed to give classical test and item statistics by using special analytical software.
- Item parameters were used to select the items in the context of national assessment surveys.

In addition to classical statistics, IRT parameters were estimated using specialist software including Bilog-MG and Parscale. Item response curves were generated and discussed in the group when considering the selection of items.

- The performance of all items was reviewed in all regional languages, particularly in reference to English and Hindi.
- Poorly performing and flawed items were rejected.

1.2.9 Test booklet construction

For the construction of booklets for the main survey, the following steps were taken:

- Reviewed all 'new' items by considering classical item statistics, parameters and 'fit' from the IRT analysis, and evidence of differential item functioning for different groups/languages.
- Reviewed 'old' items, including those being considered for use as anchor items by considering statistical evidence of previous performance. Selected 'good' items.
- Grouping of cognate items (i.e., by assessment objective) into time-limited 'blocks'.

It was decided that within a subject, all the three forms would contain a block of anchor items. In EVS and Mathematics, a minimum of 20 anchor items would be used. In Language, 15 items of reading comparison and 5 items of language elements would be used as anchors. Therefore, three common passages would be used in each booklet. And each booklet would have a new passage also. The structure of the Mathematics and EVS booklet was as under.

Form 1	Form 2	Form 3
B	D	F
A Anchor Block		
C	E	G
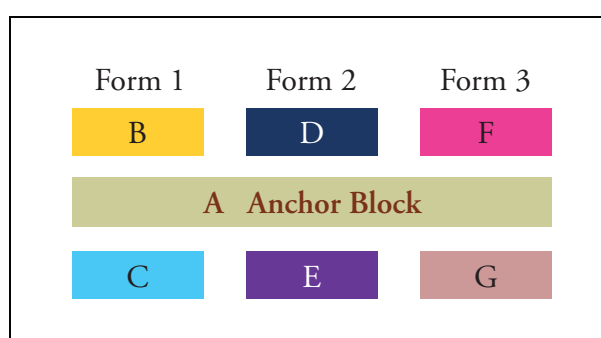
Table 1.2: Three dimensional grid for tests				
Skills\Contents	**Skill 1**	**Skill 2**	**Skill 3**	**Total**
Topic 1	easy–2 medium–1 hard–1	easy–3 medium–4 hard–2	easy–0 medium–4 hard–3	20 Items
Topic 2				20 Items
Topic 3				15 Items
Topic 4				25 Items
Total	25 Items	30 Items	25 Items	**80 Items**

In all the subjects, the following domains were identified:

Language	**Mathematics**	**EVS**
Language Elements	Arithmetic	Social Studies
Reading Comprehension	Algebra	Science
Writing	Geometry	–

In each domain, there were a number of sub-domains or topics. These items were again vetted by subject experts. Each test was reviewed in the light of the content area covered, competency covered, appropriate language, estimated difficulty level and also the homogeneity of distractors. A similar procedure was used for developing tests in different languages. While undertaking the translation activity, back translation was one of the ways adopted to authenticate whether the translated version retains the original meaning.

Finally, for class V (NAS), each test form for EVS and Mathematics consisted of 40 multiple choice items. Thus, overall 80 unique items were used in each subject to measure learning achievement. In Language, in addition, each booklet included a writing task to test the writing skills of class V students. Scoring keys were also developed for each test form in each subject.

In the cover page of the test, instructions for students and examples indicating how to record responses and change the response in case of any mistake on the test booklet were also prepared and translated in various languages for all the three subjects.

1.2.10 Questionnaires

Questionnaires for class V (NAS) were built upon experience from the earlier BAS and MAS surveys and incorporated ideas from international assessment instruments. For this survey, three questionnaires were developed to collect information on a) schools, b) teachers, and c) pupils and their backgrounds. The process of drafting questionnaires began in September 2009 and the pupil questionnaire was piloted in the field trial of the test booklets in November/December 2009.

■ Draft questionnaires were prepared and sent to international experts for review.

■ Amended student questionnaires were tried out with test booklets, using a group of 100+ students chosen for convenience. Responses were then analysed and linkage with test booklets checked.

■ Amended teacher questionnaires were tried out by a group of invited teachers.

The final version of the pupil questionnaire was translated into 15 Indian languages. The school and teacher

questionnaires were produced in Hindi and English only, as it was considered that school principals and teachers were proficient at least in one of these languages.

The pupil questionnaire was strongly influenced by international best practices. Students selected for TAS were not tested in all three subjects. Therefore, the student questionnaire was revised so that it fits the new test administration procedures—especially the distribution of the various test booklets among students ('spiralling').

The pupil questionnaire contained questions pertaining to the home background of students. Areas touched upon included parents' level of education and occupation; help available at home for studies from parents and siblings; and the study materials and resources available at home. The questionnaire also investigated the experience of pupils in school. This included questions about class work and homework given by teachers, and whether they liked coming to school etc.

The school questionnaire sought information on the location, enrolment and structure of the school; the number of school days; and the school's infrastructure and environment. Other questions related to teachers' job satisfaction and their professional development opportunities, curriculum transaction strategies, and problems existing in schools.

The teacher questionnaire comprised questions regarding the age of teachers, academic and professional qualifications, training programmes attended, teaching and evaluation practices, teaching materials available to them, interaction with other teachers and the school head, and their job satisfaction.

The teacher and school questionnaires should be analysed to check that the information which is available from other sources is not being gathered (e.g. the school database used for drawing the sample). Avoiding duplication will improve efficiency.

1.3 The NAS Sample

The class V (NAS) was designed to investigate learning achievement in the government system at the state/UT level. Hence, the target population for the survey was all class V children studying in government schools, local body schools, and government-aided schools. Completely private schools were not included in this survey. The proportion of pupils in private schools varies between states.

In general, the sample design for each state/UT involved a three-stage cluster design which used a combination of two probability sampling methods. In the first stage, districts were selected using Probability Proportional to Size (PPS) sampling principles. This means that the probability of selecting a particular district depended on the number of class V students enrolled in that district. In the second stage, the requisite number of schools was selected in the chosen districts,. Once again, PPS principles were used so that large schools had a higher probability of selection than small schools. In the third stage, the required number of students in each school were selected using the Simple Random Sampling (SRS) method. In schools where class V had multiple sections, an extra stage of selection was added with one section being sampled at random.

In the survey, PPS sampling was based on class V enrolment data from the DISE 2007–08. SRS sampling was conducted according to the class registers available in sampled schools. Although the DISE data was not free from criticism, it was used because it was considered to be the most complete and up-to-date enrolment data available at the time of sampling. Unfortunately, due to discrepancies in the DISE data, limitations in the sampling method and loss of information at the sampling and administration stages of the survey, it was impossible to estimate sample weights for the survey. Appendix I provides further details about the sampling design and procedures of the survey.

1.4 Participating States and Sample Coverage

The survey was intended to cover all 35 states and UTs, but Arunachal Pradesh, Dadra and Nagar Haveli, and Lakshadweep could not participate in this endeavour. Manipur participated in the survey administration, but faced problems in data collection and failed to report its data on time. Among the 31 participating states and UTs, six states – Jharkhand, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal – could not test class V students at the end of their academic year, i.e., December 2009. Therefore, it was decided to test class VI children at the beginning of the next academic year.

Exclusions of sub-populations from the total target population of NAS class V were made at the initial stage of sampling. Large scale educational surveys allow such exclusions for reasons such as ensuring administrative efficiency, as long as the excluded population does not critically affect the quality of the survey. For example, the exclusion of very small schools from a target population is often accepted. The class V (NAS) excluded schools having fewer than five students, or in some cases, nine students, depending on the enrolment characteristics of the state/UT. In addition to the small school exclusion, Upper Primary Only schools were excluded due to a classification error. As a result of these exclusions, population coverage of the class V sample varies from 7% to 99%. In five states/UTs of Assam, Daman & Diu, Goa, Kerala and Maharashtra, the population coverage fell below 80% mainly due to the Upper Primary Only school exclusion. It should be noted that it is virtually impossible in such surveys to achieve a sample which covers the entire population. However, if too many possible respondents are excluded, then the sample loses much of its value as a description of the population. NCERT set 80% coverage and above as acceptable for a representative picture for this study. Because of the arrangements for replacing non-cooperating schools with an equivalent (see Appendix II), it is considered that response rates at the school level are satisfactory. Unfortunately, no data is available for non-response within selected schools.

The survey classifies the participating states/UTs into three different reporting groups according to their population coverage and the class tested. A group of 20 states is classified as having 'coverage of 80 % or more'. Another group of five states has 'coverage less than 80%'. Finally, a group of six states is classified as having 'tested class VI students'. Table 1.3 summarises sampling coverage and reporting classification of the survey by state.

Table 1.3: Sample coverage and reporting classification by state							
S.No.	States and UTs	Population Coverage	Reporting Classification	S.No.	States and UTs	Population Coverage	Reporting Classification
1.	A & N Islands	96%	Class V, Adequate Coverage	19.	Lakshadweep	--	Did Not Participate
2.	Andhra Pradesh	84%	Class V, Adequate Coverage	20.	Manipur	--	Incomplete and late submission of Data (Not Reported)
3.	Arunachal Pradesh	--	Not Participated	21.	Madhya Pradesh	91%	Class V, Adequate Coverage
4.	Assam	7%	Class V, Inadequate Coverage	22.	Maharashtra	53%	Class V, Inadequate Coverage
5.	Bihar	98%	Class V, Adequate Coverage	23.	Meghalaya	NA	Class VI
6.	Chandigarh	96%	Class V, Adequate Coverage	24.	Mizoram	NA	Class VI
7.	Chhattisgarh	87%	Class V, Adequate Coverage	25.	Nagaland	NA	Class VI

8.	Dadra & Nagar Haveli	--	Not Participated	26.	Orissa	93%	Class V, Adequate Coverage
9.	Daman & Diu	50%	Class V, Inadequate Coverage	27.	Puducherry	99%	Class V, Adequate Coverage
10.	Delhi	99%	Class V, Adequate Coverage	28.	Punjab	92%	Class V, Adequate Coverage
11.	Goa	51%	Class V, Inadequate Coverage	29.	Rajasthan	84%	Class V, Adequate Coverage
12.	Gujarat	96%	Class V, Adequate Coverage	30.	Sikkim	NA	Class VI
13.	Haryana	94%	Class V, Adequate Coverage	31.	Tamil Nadu	94%	Class V, Adequate Coverage
14.	Himachal Pradesh	93%	Class V, Adequate Coverage	32.	Tripura	99%	Class V, Adequate Coverage
15.	Jammu & Kashmir	92%	Class V, Adequate Coverage	33.	Uttar Pradesh	98%	Class V, Adequate Coverage
16.	Jharkhand	NA	Class VI	34.	Uttarakhand	92%	Class V, Adequate Coverage
17.	Karnataka	90%	Class V, Adequate Coverage	35.	West Bengal	NA	Class VI
18.	Kerala	59%	Class V, Inadequate Coverage				

1.5 Characteristics of Participating States

Table 1.4 shows that the states and UTs that participated in this survey vary greatly in their physical, demographic and socio-economic characteristics. For example, Bihar, Maharashtra and Uttar Pradesh each have populations of more than 100,000,000 whilst Daman & Diu, and the Andaman and Nicobar Islands have fewer than 400,000 inhabitants. Mizoram has a population density of just 52 people per square kilometre whilst the corresponding figure for Delhi is over 11,000. The great disparity in the economic resources of states and hence the funding available for education is exemplified by the differences between economically advantaged states such as Delhi, Goa, Maharashtra and Haryana (each with GDP per capita greater than INR 50,000) to those with relatively low incomes such as Bihar and Madhya Pradesh (each with GDP per capita less than INR 20,000).

Of particular importance in this survey are the significant differences in the provision of education at the class V level. For example, the target population for this survey was all class V students enrolled in government-run and government-aided schools. However, the proportion of class V students in such schools varied significantly amongst states. For example, in Bihar, West Bengal and Goa, nearly 100% of class V students are in government schools with an insignificant proportion in private schools. By way of contrast, in Nagaland, fewer than 50% of class V students are enrolled in government schools.

These and associated factors are likely to influence student achievement and other educational outcomes. Therefore, when considering the findings of this survey and, in particular, when comparing the achievement levels of different states, it is important to take the prevailing conditions into account to ensure that like is being compared with like.

Table 1.4: Selected physical, demographic and socio–economic indicators for the states and UTs of India

States and UTs	Population+	Area (sq. km)	Population Density (per sq. km)+	GDP(INR millions)****	GDP per capita (INR)***	Per-capita Income (INR)-2010**	Class V enrolment (All schools)*	Class V enrolment (Govt. & Govt.-aided)*	Sex ratio (female per 1000 males)+	Ratio Govt: All schools*	Literacy Rate+	Gross Enrolment Ratio (Class I-V)++
A & N Islands	3,79,944	8,249	46	15,620	43,876	74,340	7,561	6,471	878	0.86	86.27	101.8
Andhra Pradesh	8,46,65,533	275,045	308	2,691,730	33,200	51,025	1,355,758	890,628	992	0.66	67.66	95.5
Assam	3,11,69,272	78,483	397	575,970	21,607	27,197	687088	642984	954	0.94	73.18	106.1
Bihar	10,38,04,637	94,164	1102	796,820	9,614	16,119	1,872,017	1,867,758	916	1.00	63.82	104.4
Chandigarh	10,54,686	144	9252	98,720	109,688	120,912	16,606	11,315	818	0.68	86.43	96.1
Chhattisgarh	2,55,40,196	135,194	189	519,210	24,921	38,059	500,598	436,829	991	0.87	71.04	125.5
Daman & Diu	2,42,911	122	2169	5,028	31,781	39,970	2,890	2,387	618	0.83	87.07	135.9
Delhi	1,67,53,235	1,483	11,297	1,053,856	76,087	116,886	289,143	191,010	866	0.66	86.34	109.1
Goa	14,57,723	3,702	394	124,000	92,010	132,719	21,944	21,795	968	0.99	87.40	129.6
Gujarat	6,03,83,628	196,024	308	2,166,510	43,330	63,961	1,048,280	845,998	918	0.81	79.31	123.0
Haryana	2,53,53,081	44,212	573	1,063,850	50,312	78,781	358,622	263,773	877	0.74	76.64	90.4
Himachal Pradesh	68,56,509	55,673	123	254,350	45,391	50,365	136,668	107,540	974	0.79	83.78	111.7
Jammu and Kashmir	1,25,48,926	222,236	124	264,880	26,488	30,582	222,329	136,877	883	0.62	68.74	103.2
Jharkhand	3,29,66,238	79,700	414	629,500	23,361	30,719	800,019	752,206	947	0.94	67.63	153.9
Karnataka	6,11,30,704	191,796	319	1,707,442	35,818	50,676	1,106,586	866,323	968	0.78	75.60	106.1
Kerala	3,33,87,677	38,863	859	1,189,980	36,030	59,179	466,424	440,487	1084	0.94	93.91	92.3
Madhya Pradesh	7,25,97,565	308,144	236	1,163,220	19,274	27,250	2,019,792	1,471,511	930	0.73	70.63	153.4
Maharashtra	11,23,72,972	307,713	365	4,324,131	69,377	74,027	1,957,729	1,762,636	925	0.90	82.91	101.8
Meghalaya	29,64,007	22,429	132	64,700	28,130	42,601	63,475	57,550	986	0.91	75.48	191.5
Mizoram	10,91,014	21,081	52	26,970	30,346	45,982	31,840	21,652	975	0.68	91.58	171.0

Nagaland	19,80,602	16,579	119	56,412	28,346	21,434	41,451	16,631	931	0.40	80.11	92.5
Orissa	4,19,47,358	155,707	269	785,360	21,338	33,226	859,069	822,711	978	0.96	73.45	117.0
Puducherry	12,44,464	492	2598	57,000	58,684	82,767	21,373	14,184	1038	0.66	86.55	144.4
Punjab	2,77,04,236	50,362	550	1,097,350	44,901	62,153	309,554	259,748	893	0.84	76.68	92.8
Rajasthan	6,86,21,012	342,236	201	1,242,240	24,921	34,189	1,375,324	880,421	866	0.64	67.06	118.3
Sikkim	6,07,688	7,096	86	18,030	25,018	48,937	14,490	12,960	889	0.89	82.20	148.0
Tamil Nadu	7,21,38,958	130,058	555	2,462,660	39,300	62,499	1,213,607	903,890	995	0.74	83.33	116.1
Tripura	36,71,032	10,492	350	91,240	28,512	35,799	85,178	81,519	961	0.96	87.75	147.8
Uttar Pradesh	19,95,81,477	240,928	828	2,360,442	15,600	23,132	4,133,429	3,063,248	908	0.74	69.72	113.7
Uttarakhand	1,01,16,752	53,566	189	257,760	30,362	55,877	185,980	133,500	963	0.72	79.63	119.4
West Bengal	9,13,47,736	88,752	1029	2,360,340	30,950	41,469	1,794,862	1,732,376	947	0.97	77.08	112.9
India	1,21,01,93,422	3,287,240	382	37,900,630	46,492				940		74.04	114.0

Source : The District Information System for Education 2007–08.

+ Source: Census of India 2011, Provisional Population Totals

++ Source: Economic Survey 2010−2011, Government of India, Oxford University Press

**Source: Data exclusively compiled by the VMW Analytic Services and provided by the Federal State Governments.

*Three States/UTs do not announce their respective economies, hence, VMW Analytic come out with the rough income estimates.

1.6 Administration of Tools

When conducting NAS, NCERT takes the help of state agencies like SCERTs and SIEs to coordinate survey activities in the states/ UTs. Each participating state designates a state coordinator who has the responsibility of implementing the NAS in his/her state/UT in accordance with the NAS guidelines. The state coordinators are given training on how to collect data in the field. For this, a detailed guideline-cum-training manual was developed by DEME. Further, state coordinators provide training to district coordinators about the conduct of main achievement survey. In each selected district, district coordinators appoint 10 to 12 teams of field investigators. Each team comprises two field investigators. They are given rigorous training about selection of section and students in the sampled schools, administration of tools and transfer of response from test booklet to separate response sheet. These response sheets are collected by the district coordinators and then sent to the state coordinator after checking their number, coding of schools, and whether they have been properly filled by the investigators. These response sheets are dispatched by the state coordinator to NCERT where they are scored and analysed. Without the help, dedication, competence and experience of the state coordinators and their teams for which they should be commended, the massive task of data collection for the National Achievement Survey would not have been possible.

1.7 Monitoring

For monitoring, a financial provision at the state and district levels was made and funds were provided to states. It was communicated to the states that at least 10–15 schools are to be monitored randomly during the actual conduct of the survey by the SCERT faculty. Similarly, 5–10 schools in each district are to be monitored by the District Institute of Education and Training (DIET) faculty. The responses on questions regarding monitoring during the test administration and data collection did not reveal any clear system of monitoring. While 84% of the state officials and 95% of the district coordinators stated that they visited schools to monitor the administration of NAS but when asked how many times they visited the field, response from state coordinators revealed that 21% made visits to the field once and 21% said twice. The response of the district coordinators to the same question revealed that 23% made field visits twice and 16% said five times.

NCERT team reflected that there was no monitoring done from their end while the survey was being conducted and they relied too heavily on the state and district coordinators to carry out the monitoring tasks.

1.8 Data Management

NCERT received material from all states regarding NAS field work. After getting material from the states, NCERT project team checked and organised materials school-wise and prepared batches having details about the school code, district code, number of response sheets, number of pupils and teachers, and school questionnaire and field notes. The codes of questionnaires and response sheets were matched and needful corrections were made wherever there was any discrepancy.

Work was outsourced to a computer agency for transfer of data from paper forms to electronic format. Data entry plan and data analysis plan were developed in the department keeping in mind the objectives of the study. Both plans were provided to the computer agency for doing the assigned task in a systematic manner.

The computer agency provided soft copy of the data entered. In the department, the project team checked and verified the quality of the data and resolved problems of mismatching files. Files of clean data were finalized for

further analysis. Data analysis was carried out by using both Classical Test Theory (CTT) and IRT. The analysis of data carried out is given in next section.

1.9 Analysis of Data

In earlier surveys (i.e. BAS and MAS), the learning achievement data was analysed using CTT and average scores were reported simply as the percentage of correct answers. This approach, whilst valid, has significant limitations. In particular, the results are linked to particular tests and groups of students so it is very difficult to use multiple tests or to link results from one year to another. Therefore, it was decided to analyse the data for this and future surveys using Item Response Theory (IRT) in addition to the classical approach. This is in keeping with the best practice of major international surveys such as Programme for International Student Assessment (PISA), Progress in International Reading Literacy Study (PIRLS) and TIMSS. In this survey, a two-parameter logistic model was used (Appendix II).

The main reason for administering the tests in this study was to obtain an estimate of the overall ability of the students tested. Previous studies have reported proportion correct scores on a range of items. This survey has seen the mode of reporting scores changed to the more widely accepted IRT method. IRT assumes that there is a statistical connection between the difficulty of an item, the ability of the student, and the probability of being successful on the item. Students with higher ability scale scores are more likely to succeed on any item than their peers of lower ability, while all students are less likely to succeed on items with higher difficulty scores. In fact, a student's probability of success on a particular item is dependent on the difference between the ability of the student and the difficulty of the item.

Whilst this method makes the analysis more complex than traditional methods, it has many advantages. Firstly, it places students and test items on the same numerical scale. This enables us to produce meaningful 'maps' of items and students. Secondly, in IRT, the difficulty parameter for an item does not depend on the group of test takers. This allows us to use multiple test booklets which can be 'linked' or equated. This can also be used, for example, to compare scores from tests used in different years/cycles – an essential characteristic for monitoring progress over time.

In preparation for data analysis, data files and supporting documents were collated, checked and forwarded to ETS. The following files were provided:

- Data entry manual and coding instructions
- Copies of the final test booklets – 9 booklets (English language versions)
- Spreadsheet showing structure and item positions for each booklet
- Answer keys
- Student responses (all test booklets) for Goa and Chandigarh
- Corresponding responses for the school, pupil and teacher questionnaires

ETS experts, after doing preliminary analyses, decided what kind of classical and IRT test analyses would be used for the analysis of the full dataset received from 31 states/UTs. Under CTT, the performance of students on anchor items was carried out by computing percentage correct scores and averages, standard deviations of test scores, and t-values between different groups. Under IRT, a detailed analysis was carried out to determine the scaled scores, standard errors, percentile scores, significant differences between the groups etc. The detail of the IRT model used is provided in Appendix II.

Besides, impact of the intervening variables was analysed by using statistical techniques of regression analysis.

Regression analysis

Regression analysis was used to see the impact of underlying variables in more detail. Regression analyses of outcome were conducted for a range of pupil and school factors, first for the factor on its own, and then after allowing for two 'key' factors:

a)   Socio-economic status

b)   Speaking language of instruction at home

The variables analysed under pupil and school, and teacher related variables were of three types: dichotomous variables having only two possible discrete values; categorical variables having more than two possible discrete values; and, quasi-continuous variables having a wide range of possible values across a numerical scale (e.g., number of siblings). The treatment applied to each type of variable is described in chapter 8.

1.10 Understanding the results

1.10.1 The reporting scale

Throughout this report, results are reported using 'scale scores' calculated using IRT. These replace the percentage correct scores that were used in previous reports. This change brings important advantages. Most importantly, the scale will be fixed so that results from future surveys can be reported on the same scale. Thus, provided adequate linking procedures through common items are incorporated, a score of, say, 270 today will be equivalent to a score of 270 in three years' time, even though the items used are not the same.

So if, for example, over a three-year period, a state's average score in Mathematics rises from 248 to 254, we can compare these directly and draw meaningful conclusions about changes in student achievement. This is possible because even though the scores have been derived from different students taking different tests at different times, the reporting scale is fixed.

The average score for the whole population tested is initially set at 250, with a standard deviation of 50. However, if educational standards improve, the overall average will rise.

The Reporting Scale

100	200	300	400

Low achievement   Mid - point = 250   High achievement
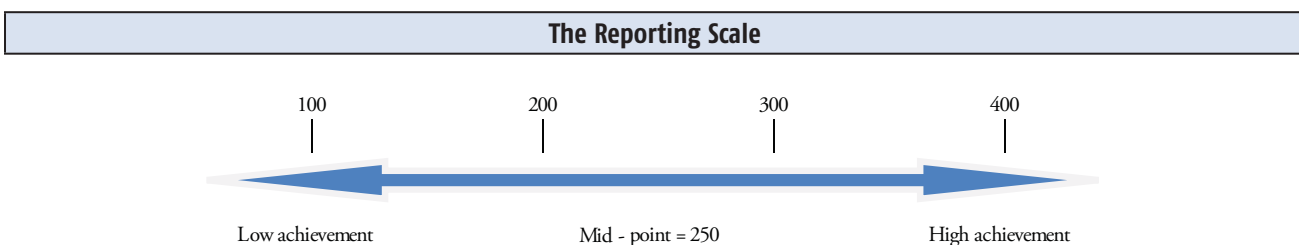
This means that the majority of students (about 70%) will have scores in the range 200 to 300. On this scale, a score of more than 400 would represent an extraordinarily high level of achievement.

It should be noted that the adoption of this more sophisticated reporting scale means that it is not possible to make direct comparisons with the values reported in earlier surveys.

In this report, all values related to the achievement of students are given on scales calibrated to have 250 in the centre as described above. However, the scores for Mathematics, Reading Comprehension and EVS are derived by applying the same principles but independently. Therefore, it is important that readers do not compare scores across subjects.

1.10.2 Tables of Results

Tables of results presented in different chapters record basic statistics such as the average score achieved by students in a particular state in a particular subject. Average scores indicate how typical students performed in the survey's tests. However, in order to give information about the performance of lower-, middle- and higher-performing students, results are also reported at five key percentiles (10th, 25th, 50th, 75th and 90th). For example, the score at the 25th percentile is the score which 75% of students achieve or surpass, and the score at the 90th percentile is the score that 10% of students achieve or surpass. The range between the 25th and 75th percentiles (the inter-quartile range) represents the performance of the middle 50% of students. This, therefore, is a good indicator of the degree of homogeneity within a state's student cohort.

Where average scores are reported, these have been calculated for the students who were selected to take part in this survey. If other students had, by chance, been selected, then it is possible that a slightly different average would have been recorded. The likely size of this sampling error – an inevitable consequence of the student selection process – can be estimated and a measure of this is reported as the standard error associated with a value.

The size of the standard error of a measurement should be taken into account when considering reported values. For example, the average EVS score for students in Gujarat was '250' with an estimated standard error of about three scale points. This means that we can be 70% confident that the 'true' value of Gujarat's average EVS score lies in the range 247 to 253 (i.e. 250 ± 3). Furthermore, we can be 95% confident that the 'true' value of Gujarat's average EVS score lies in the range 244 to 256 (i.e. 250 ± 6).

The fact that all calculated values have an associated error is of particular importance when comparing, for example, the average scores of two states. For example, Gujarat has an average EVS score of '250' which is lower that Orissa's average EVS score of '253'. But the standard error in both cases is approximately three scale points. This means that if we were to repeat the measurement using different samples of students, there is a significant chance that Gujarat's score would now be higher than that of Orissa.

To help readers make valid comparisons, many tables include the results of tests of significance. These are statistical checks which, by taking into account the two values being compared and their standard errors, indicate whether an observed difference is likely to be a true difference or whether it may have happened by chance. In this report, such tests have a confidence level of 95%. This means that if a difference is marked as being 'statistically significant', then the probability of it happening by chance is less than 5%.

1.10.3 Tables related to pupil, teacher and school variables

The nature of the pupil, teacher and school related variables is of different types – therefore, a different type of treatment was given for analysing data related to them. The information provided in the data tables is complicated in nature, therefore, some examples regarding reading tables and interpretation of data are given below. These show the regression results between different intervening variables and language achievement scores. Similar tables were created for Mathematics and EVS and all findings are given in chapters 8, 9 and 10. The three columns under the subject show the relation between the variables and subject score without and with allowing key background variables, namely the socio-economic background variables and speaking the language of instruction at home.

To understand the data provided in the table, an example for each type of variable is explained below.

1.   Dichotomous Variables

In dichotomous variables such as 'having a subject textbook' there are only two possible discrete values: 'have' and 'don't have'. One of these is taken as the base category and assigned a value of zero. Differences with respect to this base category are reported. The interpretation of dichotomous variables is given below:

Table 1.5: Regression Results – Students having subject textbooks			
Variables	**Language**		
	Coeff	**SE**	**Sig.**
Without key variables	8.46	1.75	**
With key variables	7.75	1.70	**

*Significant if P<.05 , **Significant if P<.01, NS–Not Significant

In this case, 'not having a textbook' is taken as the base category. The coefficient of 8.46 (without including key variables) means that, on average, students with a Language textbook outscore those without by 8.46 scale score points. This difference is statistically significant. Taking the key variables into account reduces the coefficient slightly to 7.75, but the positive effect of having a textbook remains significant.

2.   Categorical Variables (with more than two values)

The interpretation of categorical variables (with more than two values) is given in Table 1.6:

Table 1.6: Regression results– School management-wise				
Variables		**Language**		
		Coeff	**SE**	**Sig.**
Without key variables	Zila Parishad	9.28	2.11	**
	Local Body/Municipal Committee	9.34	2.25	**
	Tribal Social Dept.	12.91	7.46	NS
	Private aided	16.96	1.88	**
With key variables	Zila Parishad	9.42	2.15	**
	Local Body/Municipal Committee	7.78	2.17	**
	Tribal Social Dept.	−9.03	7.28	NS
	Private aided	13.90	1.83	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Under this variable, there are five possible responses – government managed, zila parishad, local body, tribal schools and private aided. The largest category (government managed) is taken as the base category and its scores taken as the zero point, and regressions for the other categories expressed as deviations from this. The table shows that, for example, pupils from private aided schools perform significantly better than those from government managed schools in Language. On average, those in private aided schools outperform pupils in government managed schools by 16.96 score points. After including key variables, the difference is reduced slightly but still remains statistically significant.

3. Quasi-continuous Variables

Finally for variables treated as quasi-continuous, the minimum number is taken as a base value. For example, the variable 'number of siblings' can have values 0, 1, 2,…, 10 or more and so is treated as quasi-continuous. In this case, zero is taken as the base value.

The interpretation of continuous variables is given in Table 1.7:

Table 1.7: Regression Results – Siblings-wise			
Variables	**Language**		
	Coeff	**SE**	**Sig.**
Without key variables	−1.87	0.21	**
With key variables	−0.99	0.21	**

*Significant if P<.05 , **Significant if P<.01, NS–Not Significant

Here the coefficient -1.87 means that for each *additional* sibling, pupils on average score 1.87 points lower in Language. Therefore, pupils with two siblings will, on average, score 1.87 scale score points lower than their peers with a single brother or sister. Correspondingly, pupils with three siblings will, on average, score 3*(1.87) = 5.61 points lower than those who have no brothers or sisters. This effect is lower when the key variables are taken into account but remains statistically significant.

1.11 Organisation of the Report

The report contains 11 chapters and appendices.

Student achievement: In chapters 2, 4 and 6, achievement of class V students is presented. Their achievement in Language, Mathematics and EVS are separately reported vis-à-vis the overall achievement of the other participating states in different groups. In addition, information about differences in achievement by students' gender, school location and social category is also provided.

What students know and can do: Chapters 3, 5 and 7 describe what class V students know and can do in Language (Reading Comprehension and Language elements), Mathematics and EVS respectively. For each subject, the test description is given along with the cognitive processes tested. To understand student performance in different subjects, item maps were prepared using the scale scores, mental processes and item description.

Impact of student, school and teacher related variables on achievement of students: Chapters 8, 9 and 10 are each divided in two parts. Part 1 deals with profiles of student, school and teacher respectively. Whereas in Part II, an attempt is made to see the impact of student, school and teacher related variables on students' attainment by using regression analysis.

The last chapter of this report deals with equity and the success of the Sarva Shiksha Abhiyan programme in providing equality of opportunity.

Besides the above stated chapters, the report contains a number of appendices providing more information about sample design and procedures, scaling the NAS data and estimating sampling variance, performance on anchor

items, creating a socio-economic index, list of surveyed states, districts, schools, teachers and students, list of state coordinators etc.

1.12 Limitations

This survey undoubtedly represents a significant step forward in the development of national achievement surveys in India. However, as with all such enterprises, lessons have been learnt. In conducting the Class V NAS, the following limitations have been noted so that they may be addressed in future achievement surveys:

- The survey used DISE 2007–08 data from the National University of Educational Planning and Administration (NUEPA) as the primary sample frame. Once in the field, significant discrepancies between the DISE data and actual school enrolments were noticed.

- In some states, sampled schools were changed by the state personnel because of disturbances in states due to various reasons. Hence, the data collected in such states may not be as representative as initially planned.

- Due to discrepancies in the sample frame, deviation from agreed sampling procedures, and loss of information during administration, it was not possible to estimate sample weights for the survey.

- In the states of Jharkhand, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal, the tests had to be administered at the beginning of class VI rather than at the end of class V due to administrative reasons.

- In most of the states, responsibility for data collection was given to DIET faculty who, in turn, used their students as field investigators. On reflection, the training and hands-on practice given to these field investigators may not have been sufficient resulting in inefficiencies in the data collection procedure and, hence, increased demands during the data cleaning process.

- In order to meet the key objectives of this survey, schools and students were sampled in a systematic fashion. This meant that teachers could not be explicitly sampled in the same way. As a result, the analysis of teacher-related variables vis-à-vis student attainment could not be made in a comprehensive manner.

- In past surveys, the CTT model was used for developing tests and analysing the results. In this survey, IRT was used. These two methodologies are quite different. Therefore, the results of this survey are not directly comparable with those of past surveys.

- For the first time, NCERT used IRT for analysis of results instead of CTT. Therefore, results are reported in terms of scale scores rather than percentage correct scores. Whilst this is an important step towards emulating international best practice, unfamiliarity with this approach has undoubtedly made it more difficult for the lay reader to interpret results. It is hoped that as IRT becomes more widely used in India, understanding will improve.

Chapter 2

Student Achievement in Language

CHAPTER 2 STUDENT ACHIEVEMENT IN LANGUAGE

The Language tests used in the NAS included three categories of items: those testing 'reading comprehension'; those testing 'language-specific elements' such as vocabulary and grammar; and 'extended writing' tasks. The tests were administered in 15 languages. Within these, the reading comprehension passages and their associated items were translated directly and hence, are comparable. The language-specific items were of necessity, unique to each language. The writing tasks were common across languages, but the variability of marking was too great to allow meaningful comparisons to be made. Therefore, this report focuses on student achievement in the reading comprehension domain only. Information from the other language items will be subjected to secondary analysis and reported separately.

Overall achievement in the reading domain is reported for each of the participating states and UTs. In addition, information about differences in achievement by student gender, school location and social category is provided. In the majority of states, students nearing the end of class V were tested. However, in a few states, the arrangement of the school year meant that students had to be tested at the beginning of class VI. Results for these groups are presented separately to reduce the chance of readers inadvertently comparing different cohorts.

2.1 How did the states and UTs perform in Reading Comprehension?

Tables 2.1, 2.2 and 2.3 show the distribution of student achievement for the 31 participating states and UTs. Each table represents one of the three categories: those where class V students were tested and where sample coverage was adequate; those where class V students were tested but where sample coverage was inadequate; and those where class VI students were tested. Within each group, states are listed in alphabetical order.

The tables list each state's average score on a scale from 0 to 500. For each score, the 'standard error' is given to indicate the degree of imprecision arising from the sampling process. Finally, the tables indicate whether a state's average score is significantly different from the group's average or not.

Table 2.1: Average Reading Comprehension scores for states and UTs where class V students were tested and population coverage was >80%			
States and UTs	**Average Score**	**Standard Error**	**Significant Difference**
A & N Islands	233	2.1	⊍
Andhra Pradesh	244	2.1	●
Bihar	228	2.6	⊍
Chandigarh	245	2.5	●
Chhattisgarh	229	3.2	⊍
Delhi	258	3.4	⊓
Gujarat	251	2.7	●
Haryana	236	1.9	⊍
Himachal Pradesh	241	2.4	⊍
Jammu & Kashmir	250	2.8	●
Karnataka	262	2.7	⊓
Madhya Pradesh	250	3.9	●
Orissa	253	3.5	●

Puducherry	222	2.1	�
Punjab	252	2.7	●
Rajasthan	251	3.0	●
Tamil Nadu	278	2.5	☝
Tripura	253	2.8	●
Uttar Pradesh	282	3.4	☝
Uttarakhand	232	2.8	☟
Group Average	**247**	**0.6**	

● The state's average score is not significantly different from that of the group.
☝ The state's average score is significantly above that of the group.
☟ The state's average score is significantly below that of the group.

Twenty states and UTs represented in Table 2.1 are those in which class V students were tested and where the sample covered at least 80% of the target population. The average score for this group was 247 (with a standard error of 0.6). The results reveal substantial differences in Reading Comprehension achievement between the highest performing state (282 for Uttar Pradesh) and the lowest performing state (222 for Puducherry). Four states had average scores significantly above that of the group; seven states had average scores significantly below that of the group; and nine states had average scores that were not significantly different from that of the group.

The group included nine states in which the language of assessment was Hindi. Amongst this group, there was a wide range of outcomes. Uttar Pradesh had the highest average level of achievement (282) and Bihar the lowest (228). The performance levels of the other states in the Hindi group fell between these extremes: Delhi (258); Rajasthan (251); Madhya Pradesh (250); Himachal Pradesh (241); Haryana (236); Uttarakhand (232); and Chhattisgarh (229).

Table 2.2: Average Reading Comprehension scores for states and UT where class V students were tested and population coverage was <80%			
States and UT	**Average Score**	**Standard Error**	**Significant Difference**
Assam	240	2.3	☟
Daman & Diu	255	4.3	●
Goa	257	4.4	●
Kerala	277	1.9	☝
Maharashtra	266	2.1	☝
Group Average	**259**	**1.4**	

● The state's average score is not significantly different from that of the group.
☝ The state's average score is significantly above that of the group.
☟ The state's average score is significantly below that of the group.

The five states and UTs represented in Table 2.2 are those in which class V students were tested but where the sample covered less than 80% of the target population. For this group, great care should be taken when considering an average score as it may not be a reliable measure for the whole state/UT.

Table 2.3: Average Reading Comprehension scores for states where class VI students were tested			
States	**Average Score**	**Standard Error**	**Significant Difference**
Jharkhand	237	3.0	☟
Meghalaya	250	2.5	●
Mizoram	260	1.1	☝

Nagaland	248	2.8	●
Sikkim	246	1.7	↻
West Bengal	266	2.3	∩
Group Average	**251**	**1.0**	

● The state's average score is not significantly different from that of the group.
∩ The state's average score is significantly above that of the group.
↻ The state's average score is significantly below that of the group.

The six states represented in Table 2.3 are those in which class VI students were tested. For this group, the average score was 251 (Standard Error 1.0). Mizoram and West Bengal performed significantly better than the group average whereas the average scores of Sikkim and Jharkhand were significantly below the group average.

The tables and figures that follow illustrate the range of achievement within states and across groups of states. The tables list the scores achieved by students at key percentiles. For example, the score at the 25th percentile is the score which 75% of students achieve or surpass; the score at the 90th percentile is the score that 10% of students achieve or surpass.

The range between the 25th and 75th percentiles (the inter-quartile range) represents the performance of the middle 50% of students. Hence, this is a good indicator of the state's degree of homogeneity in terms of the Reading Comprehension achievement of its students.

Table 2.4: Percentile scores in Reading Comprehension for states and UTs where class V students were tested and population coverage was >80%							
States and UTs	**10th percentile**	**25th percentile**	**50th percentile**	**75th percentile**	**90th percentile**	**Range 75−25**	**Range 90−10**
A & N Islands	183	208	227	259	291	51	108
Andhra Pradesh	191	215	236	274	307	59	116
Bihar	175	193	223	258	297	65	122
Chandigarh	192	216	238	275	303	57	111
Chhattisgarh	171	190	220	263	303	73	132
Delhi	195	223	258	295	326	73	130
Gujarat	192	219	250	282	310	63	118
Haryana	181	205	227	268	301	62	119
Himachal Pradesh	185	207	230	273	312	65	128
Jammu & Kashmir	183	217	245	284	325	67	142
Karnataka	200	224	263	297	328	73	128
Madhya Pradesh	185	215	243	280	327	66	142
Orissa	190	216	245	290	329	74	139
Puducherry	179	197	219	236	274	39	95
Punjab	190	219	247	285	321	66	131
Rajasthan	187	214	244	285	323	71	137
Tamil Nadu	216	235	276	320	352	85	137
Tripura	187	219	253	285	322	66	134
Uttar Pradesh	195	238	290	331	352	93	157
Uttarakhand	173	197	226	268	302	70	128
Group Distribution	**188**	**214**	**243**	**281**	**315**	**67**	**127**

Note : Ranges may not agree due to rounding.

Figure 2.1: Percentile scores in Reading Comprehension for states and UTs where class V students were tested and population coverage was >80%
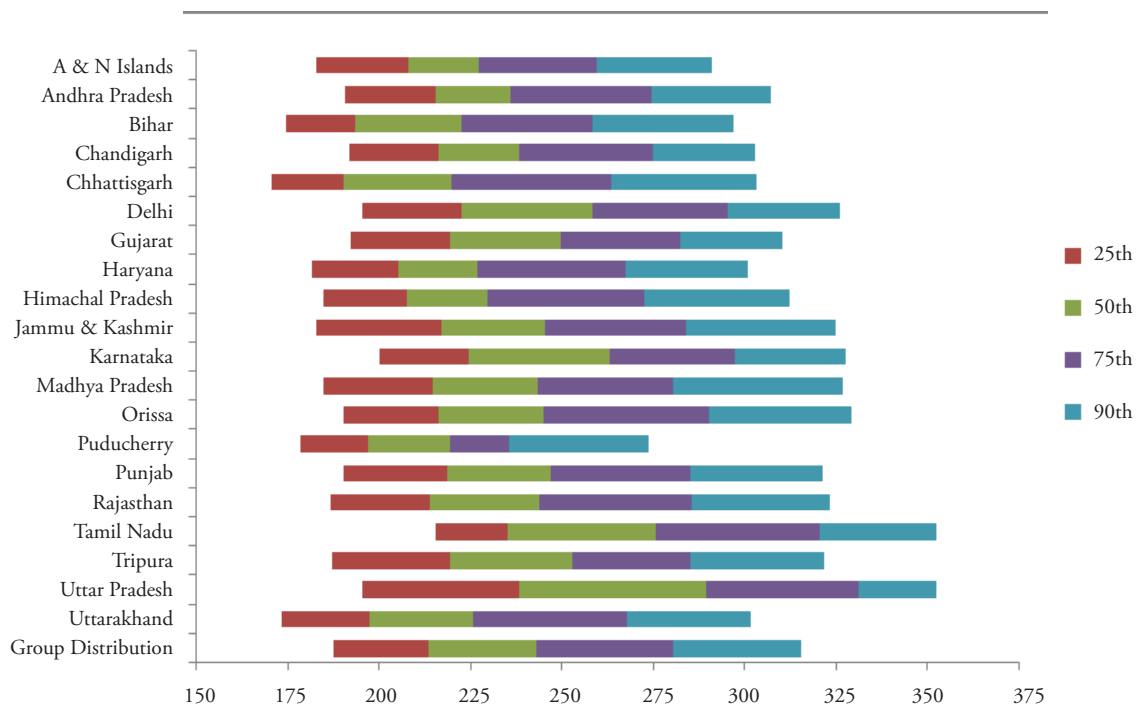
The inter-quartile range (i.e. the range between the 75th and 25th percentiles) is highly variable. For example, Puducherry has an inter-quartile range of just 39 whilst Uttar Pradesh has a corresponding value of 93. These values suggest that the class V population in Puducherry is far more homogeneous than that of Uttar Pradesh. In most states, the range of performance for the middle group was between 55 and 75 scale-score points. Performance at the 10th and 90th percentiles respectively shows extremes in low and high achievement. The range between these two points, which includes 90 percent of the population, is highly variable ranging from 95 (Puducherry) to 157 (Uttar Pradesh).

The percentiles provide additional information when comparing Reading Comprehension performance amongst states. For example, when the states are arranged in order of average score, the differences between adjacent states tend to be small. However, the range of scores may not be similar. For example, there is no significant difference between the median score of the Andaman and Nicobar Islands (227) and Uttarakhand (226). However, the score ranges between the 25th and 75th percentiles are very different: A & N Islands' range is 51 compared with Uttarakhand's range of 70. This indicates that whilst average achievement is very similar in the two areas, Uttarakhand has a more heterogeneous group of class V students than the A & N Islands.

Table 2.5: Percentile scores in Reading Comprehension for states and UT where class V students were tested and achieved population coverage was <80%

States and UT	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Range 75–25	Range 90–10
Assam	182	205	229	275	313	70	131
Daman & Diu	202	224	250	285	321	62	119
Goa	204	225	252	285	321	61	117
Kerala	216	238	280	314	335	76	120
Maharashtra	206	228	269	302	330	74	124

Figure 2.2: Percentile scores in Reading Comprehension for states and UT where class V students were tested and population coverage was <80%
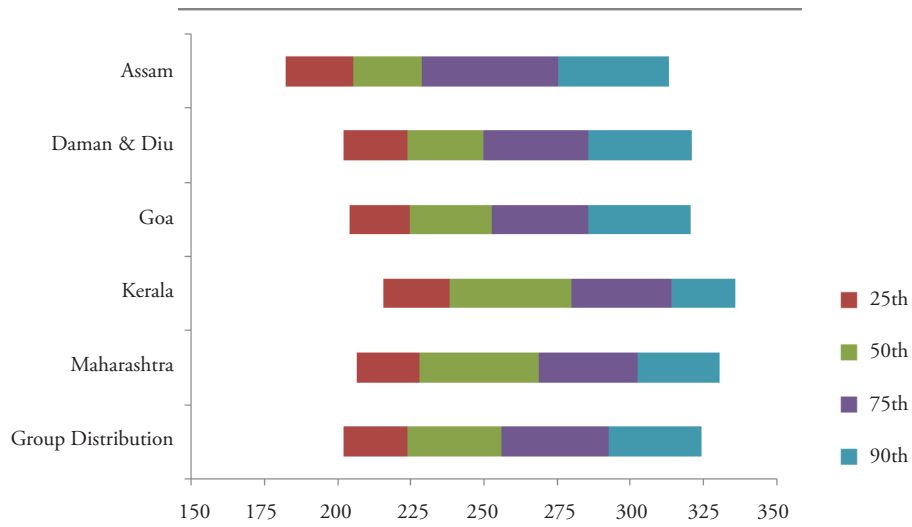
Table 2.6: Percentile scores in Reading Comprehension for states where class VI students were tested

States	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Range 75−25	Range 90−10
Jharkhand	169	196	227	277	321	81	151
Nagaland	185	212	236	282	330	70	145
Meghalaya	197	220	242	277	314	57	117
Mizoram	214	230	263	285	313	55	100
Sikkim	207	223	241	268	287	44	80
West Bengal	205	227	267	302	331	75	126
Group Distribution	**196**	**218**	**246**	**282**	**316**	**64**	**120**

Figure 2.3: Percentile scores in Reading Comprehension for states where class VI students were tested
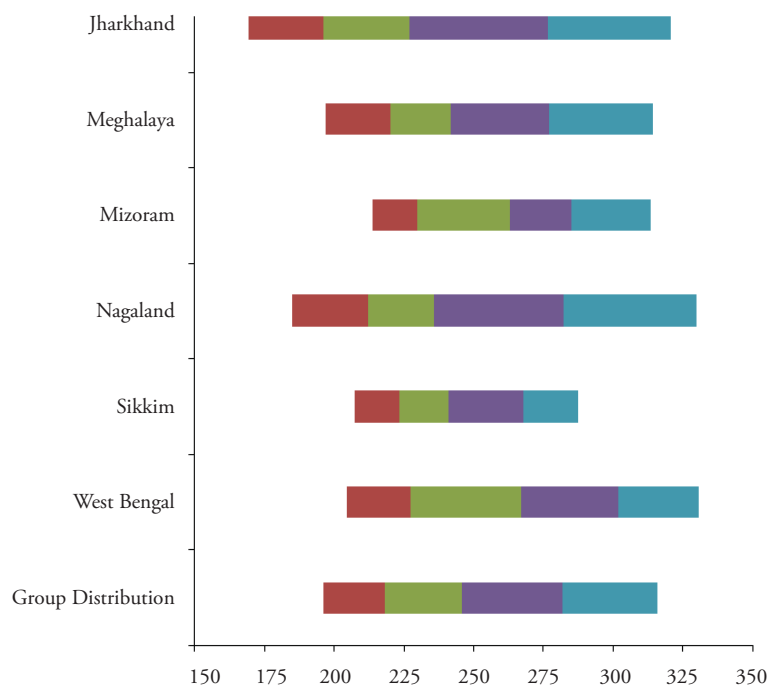
The inter-quartile range for the states where class VI students were tested varied considerably from about 44 scale points in Sikkim to more than 80 points in Jharkhand. The range of scale points covering the population from the 10th to the 90th percentile varied dramatically from the diverse states of Jharkhand (151) to Sikkim (80) where relatively little difference between high and low performing students was detected. It can be seen that even though West Bengal has a significantly higher median score than Nagaland (267 and 236 respectively), their scores at the 90th percentile are comparable (331 and 330). This suggests that very high achieving students in Nagaland are at par with their peers in West Bengal.

2.2 How did various groups perform in Reading Comprehension?

The table below compares the average performances of different groups. Performance is compared by gender, school location, and social category. (The quoted scores were calculated for the 20 states and UTs where students were tested in class V and coverage of the population was at least 80% as this group gives the most reliable picture.)

2.2.1 Are there any gender-related differences in Reading Comprehension?

Table 2.7 compares the average Reading Comprehension scores achieved by boys and girls. It shows that within this group of states, no significant difference was detected in the average achievement levels of the two groups.

Table 2.7: Average Reading Comprehension scores for groups by gender (class V)			
	Boys' Average (SE)	**Girls' Average (SE)**	**Significant Difference**
Group (by gender)	247 (0.7)	248 (0.7)	●

● No significant difference between the average performance of girls and boys.

Tables 2.8, 2.9 and 2.10 show that, in general, the general result, i.e., no significant difference between the average achievement of boys and girls, holds for all states and UTs. Only three exceptional cases were detected: the Andaman & Nicobar Islands, Kerala and Mizoram. In these, girls in the sample outperformed boys by a margin which is statistically significant.

Table 2.8: Average Reading Comprehension scores, by gender, for states and UTs where class V students were tested and population coverage was >80%			
States and UTs	**Boys' Average (SE)**	**Girls' Average (SE)**	**Significant Difference**
A & N Islands	229 (2.3)	237 (2.6)	♀
Andhra Pradesh	244 (2.7)	245 (2.2)	●
Bihar	229 (2.5)	226 (3.3)	●
Chandigarh	244 (2.5)	247 (2.8)	●
Chhattisgarh	229 (3.5)	228 (3.5)	●
Delhi	255 (4.1)	261 (4.8)	●
Gujarat	250 (3.0)	251 (3.4)	●
Haryana	233 (2.1)	237 (2.5)	●
Himachal Pradesh	239 (2.7)	242 (2.5)	●
Jammu & Kashmir	250 (3.0)	251 (3.1)	●
Karnataka	261 (3.1)	262 (2.9)	●
Madhya Pradesh	253 (5.0)	246 (4.1)	●
Orissa	254 (3.4)	253 (4.3)	●

Puducherry	220 (2.1)	225 (2.8)	●
Punjab	251 (3.1)	254 (2.8)	●
Rajasthan	251 (3.3)	251 (3.4)	●
Tamil Nadu	278 (2.9)	279 (2.6)	●
Tripura	252 (3.1)	253 (3.3)	●
Uttar Pradesh	284 (3.5)	283 (3.6)	●
Uttarakhand	232 (2.7)	232 (3.3)	●
Group Average	**247 (0.7)**	**248 (0.7)**	●

● No significant difference between the average performance of girls and boys.

☊ Girls' average performance is significantly greater than that of boys.

Table 2.9: Average Reading Comprehension scores, by gender, for states and UT where class V students were tested and population coverage was <80%

States and UT	Boys' Average (SE)	Girls' Average (SE)	Significant Difference
Assam	238 (2.3)	242 (2.9)	●
Daman & Diu	251 (4.4)	258 (4.1)	●
Goa	250 (4.7)	263 (5.1)	●
Kerala	272 (2.8)	280 (1.9)	☊
Maharashtra	264 (2.4)	267 (2.3)	●

● No significant difference between the average performance of girls and boys.

☊ Girls' average performance is significantly greater than that of boys.

Table 2.10: Average Reading Comprehension scores, by gender, for states where class VI students were tested

States	Boys' Average (SE)	Girls' Average (SE)	Significant Difference
Jharkhand	239 (3.5)	234 (3.3)	●
Meghalaya	248 (2.5)	251 (2.9)	●
Mizoram	257 (1.3)	264 (1.3)	☊
Nagaland	251 (2.9)	248 (3.4)	●
Sikkim	246 (1.8)	245 (2.1)	●
West Bengal	268 (2.8)	263 (2.8)	●
Group Average	**252 (1.1)**	**251 (1.1)**	●

● No significant difference between the average performance of girls and boys.

☊ Girls' average performance is significantly greater than that of boys.

2.2.2 Are there any differences in Reading Comprehension achievement related to school location?

Table 2.11 compares the average Reading Comprehension scores achieved by students in rural and urban schools. It shows that, within this group of states, no significant difference was detected in the average achievement levels of the two groups.

Table 2.11: Average Reading Comprehension scores for groups by location (class V)

	Rural Average (SE)	Urban Average (SE)	Significant Difference
Group (by school location)	248 (0.7)	249 (1.9)	●

● No significant difference between the average performance of urban and rural schools.

Tables 2.12, 2.13 and 2.14 show that, in general, the general result, i.e., no significant difference between rural and urban students holds for all states and UTs. However, five exceptional cases were detected: in Andaman & Nicobar Islands, the rural students outperformed the urban students whereas in four other states, namely, Orissa, Assam, Mizoram and Sikkim, urban students in the sample outperformed rural students by a statistically significant margin.

Table 2.12: Average Reading Comprehension scores, by location, for states and UTs where class V students were tested and population coverage was >80%			
States and UTs	**Rural Average (SE)**	**Urban Average (SE)**	**Significant Difference**
A & N Islands	239 (3)	225 (2.7)	⋒
Andhra Pradesh	245 (2.5)	241 (3.5)	●
Bihar	227 (2.7)	238 (10.7)	●
Chandigarh	244 (3.8)	245 (3.1)	●
Chhattisgarh	228 (3.3)	238 (12.3)	●
Delhi	263 (5.7)	257 (4)	●
Gujarat	249 (2.8)	261 (8.7)	●
Haryana	234 (2.1)	243 (3.8)	●
Himachal Pradesh	241 (2.7)	240 (6)	●
Jammu & Kashmir	251 (2.7)	240 (12.6)	●
Karnataka	263 (3)	259 (6.3)	●
Madhya Pradesh	250 (4.3)	244 (8.6)	●
Orissa	251 (3.5)	280 (12)	☋
Puducherry	220 (2.3)	227 (3.8)	●
Punjab	253 (3)	249 (5.8)	●
Rajasthan	251 (3.5)	251 (5.7)	●
Tamil Nadu	278 (2.9)	279 (5.5)	●
Tripura	252 (3.4)	255 (5.8)	●
Uttar Pradesh	283 (3.4)	278 (15.2)	●
Uttarakhand	233 (2.7)	227 (11.9)	●
Group Average	**248 (0.7)**	**249 (1.9)**	●

● No significant difference between the average performance of rural and urban students.
⋒ Rural students' average performance is significantly higher than that of urban students.
☋ Rural students' average performance is significantly lower than that of urban students.

Table 2.13: Average Reading Comprehension scores, by location, for states and UT where class V students were tested and population coverage was <80%			
States and UT	**Rural Average (SE)**	**Urban Average (SE)**	**Significant Difference**
Assam	238 (2.2)	256 (8.4)	☋
Daman & Diu	257 (5)	245 (7.8)	●
Goa	253 (6.6)	262 (5.8)	●
Kerala	276 (2.1)	283 (4.4)	●
Maharashtra	265 (2.3)	269 (4.7)	●
Group Average	**258 (1.8)**	**263 (2.9)**	

● No significant difference between the average performance of rural and urban students.
☋ Rural students' average performance is significantly lower than that of urban students.

Table 2.14: Average Reading Comprehension scores, by location, for states where class VI students were tested			
States	**Rural Average (SE)**	**Urban Average (SE)**	**Significant Difference**
Jharkhand	237 (3.3)	235 (9.5)	●
Meghalaya	250 (3.3)	250 (4.1)	●
Mizoram	258 (1.6)	264 (1.6)	↻
Nagaland	251 (3.3)	238 (6.2)	●
Sikkim	242 (1.9)	255 (2.6)	↻
West Bengal	265 (2.6)	267 (5.4)	●
Group Average	**250 (1.1)**	**252 (2.3)**	●

● No significant difference between the average performance of rural and urban students.
↻ Rural students' average performance is significantly lower than that of urban students.

2.2.3 Are there any differences in Reading Comprehension achievement related to caste category?

Table 2.15 compares the average Reading Comprehension scores achieved by students in different social categories. It shows that within this group of states, no significant difference was detected in the average achievement levels of students in the Scheduled Caste (SC) and Other Backward Class (OBC) categories. Students classified as being in the OBC category significantly outperformed those in the Scheduled Tribe (ST) group. On average, students in the General category achieved significantly higher scores than those in other categories.

Table 2.15: Average Reading Comprehension scores for groups by social category (class V)					
	Average (SE)	**SC**	**ST**	**OBC**	**General**
SC	245 (1.0)	–	⋒	●	↻
ST	240 (1.6)	↻	–	↻	↻
OBC	247 (1.0)	●	⋒	–	↻
General	253 (1.2)	⋒	⋒	⋒	–

● The average scores of the two categories being compared are not significantly different.
⋒ The average score of the category given in the first column is significantly higher than that of the category with which it is being compared.
↻ The average score of the category given in the first column is significantly lower than that of the category with which it is being compared.

2.3 Conclusion

The average achievement of students in Reading Comprehension varies greatly across the states and UTs of India. There is a highly significant difference between outcomes in high scoring states such as Uttar Pradesh (282), Tamil Nadu (278) and Kerala (277), and low scoring states/UTs such as Puducherry (222), Bihar (228) and Chhattisgarh (229).

States also vary greatly in the range between their lowest and highest achieving students as revealed by their inter-quartile score ranges. Some states/UTs such as Puducherry (39), Sikkim (44) and A & N Islands (51) have relatively homogeneous cohorts whilst others have far more diverse outcomes, e.g., Uttar Pradesh (93), Tamil Nadu (85) and Jharkhand (81).

Overall, no significant differences were detected in the average achievement of girls and boys. Similarly, no significant difference was detected between the achievement level of rural and urban students although exceptions were found in a small number of states/UTs.

The survey did find that students from the General category outperformed their peers in the SC, ST and OBC categories by a statistically significant margin.

The following chapter provides more information about what class V students at various levels of achievement know and can do in the domain of Reading Comprehension.

Chapter 3

Language: What Students Know and Can Do

CHAPTER 3 LANGUAGE:
WHAT STUDENTS KNOW AND CAN DO

3.1 Overview of the Reading Comprehension Tests

The Reading Comprehension tests given to class V students consisted of three test booklets, each containing four reading passages with five multiple choice items on each passage. The passages were chosen to represent a range of text types including informational passages, tables, public notices and stories. Three reading passages were common across all test forms. These served as 'anchors' so that the different test booklets could be linked together and hence, all items could be placed on a common scale. (See below.) In addition, each test form contained an extra, unique passage. Thus, altogether the Reading Comprehension instruments used in the survey comprised six passages and 30 items.

The items were designed to test a range of relevant *cognitive processes* or 'reading skills'. These are classified as 'locate information', 'grasp ideas and interpret' and 'infer and evaluate' as defined below:

Cognitive Processes for Reading Comprehension

Locate information: In items testing this process, students need to find and extract a specific piece of information explicitly stated in the text. 'Locating' requires students to focus on a specific element of the given piece.

Grasp ideas and interpret: In items testing this process, students need to demonstrate that they have understood an idea being conveyed in the text and have interpreted it correctly. For example, students may need to identify the text's main idea and/or the sequence of events and/or relationships between ideas, events or characters across the text. In addition, students may need to draw simple conclusions based on their interpretation of the text.

Infer and evaluate: In items testing this process, students need to demonstrate understanding beyond the information and/or ideas stated explicitly in the text. They are asked to read between the lines and, for example, make inferences about the qualities or actions of characters. They may be asked to identify the text's underlying theme and/or evaluate its title by examining the text from more than one perspective.

3.2 Item Mapping

Following testing, the responses of students to the various tasks were analysed using IRT (see Appendix II). The three test forms were then aligned using the anchor items, thereby placing all items on a single Reading Comprehension scale comprising scores from 0 to 500. On this scale, the mean score was set at 250 with a standard deviation of 50. Calibrating the items according to their levels of difficulty places them on an 'item map' with the more demanding items at the top and the easiest items at the bottom. Such item maps give us a picture as to what students at different levels of ability know and can do.

The item map for Reading Comprehension is given below. The scale score in the first column shows the level of difficulty for each item. This score also represents the score on the ability scale necessary for a student to have 50:50 chance of success on the item. The map also includes a brief description of what students needed to do to answer the item correctly, i.e., each item is classified according to the *cognitive process* being evaluated. A student's scale score gives an indication of the possibility of success on an item, if the item difficulty is known. The higher the scale score, the more likely the student is to be able to answer; the higher the item difficulty, the less likely the student is to be able to answer correctly. Thus, the item with a difficulty of 313 was difficult for this population except for the high ability students, while the item with the difficulty of 203 is likely to be relatively easy on an average.

The map shows that class V students demonstrate a wide range of ability in the domain of Reading Comprehension.

Students at the lower end of the scale, i.e., those with scale scores in the range of, say, 200 to 240 can demonstrate all three cognitive processes—provided that the context is clear and the tasks non-complex. For example, they are able to use information from a table to locate the time and the occurrence of a phenomenon, recognise a particular text type, and also make simple inferences about the causes of an act described in the text.

Students performing in the intermediate range of the scale (say, 240 to 275) can do more. In addition to that described above, they can determine the causes, frequency, duration and sequence of events described in a variety of texts. They can also identify cause and effect relationships and make complex inferences about the qualities of characters from their actions, and identify the effect of a given activity on the characters within a text.

Students performing at higher end of the scale, i.e., those with scale scores above, say, 275 can do more. In addition to that described above, they can identify the main theme of a given passage and evaluate the title. They can also

	Table 3.1: Item map in Reading Comprehension	
Scale Score	**Mental Processes**	**Question Description**
313	Infer/Evaluate	Use information to identify the main theme and evaluate the title
305	Grasp ideas/Interpret	Identify relationship between a pronoun and the object/person
300		(no item appeared at this difficulty level)
293	Grasp ideas/Interpret	Use information in the text to identify the solution to a problem
292	Grasp ideas/Interpret	Identify the causal relationship of two events
285	Grasp ideas/Interpret	Identify relationship between an abstract idea and a concrete phenomenon
279	Grasp ideas/Interpret	Grasp the relevant idea about the thinking of people from the text
279	Grasp ideas/Interpret	Use information from a notice to conclude timing of an event
279	Locate	Identify the correct place name from those given in the notice
275		(no item appeared at this difficulty level)
274	Locate	Use information from a table to determine the frequency of an event
265	Grasp ideas/Interpret	Identify relationship between an object and its characteristics
264	Grasp ideas/Interpret	Determine the sequence of activities in a process
259	Grasp ideas/Interpret	Use information in the story to identify the cause of an event
258	Grasp ideas/Interpret	Use information in the story to grasp the problem
255	Grasp ideas/Interpret	Use information in the story to determine the cause of an event
252	Grasp ideas/Interpret	Use information from the notice to derive the duration of an event
250	Locate	Use information from a table to determine the frequency of an event
249	Infer/Evaluate	Make complex inference about the quality of persons from their activities
247	Infer/Evaluate	Use information in the text to make inference about the cause of an act
247	Infer/Evaluate	Make complex inference about the effect of an activity on concerned persons
246	Grasp ideas/Interpret	Use information to draw simple conclusion about the usefulness of an object
244	Grasp ideas/Interpret	Use information in the text to identify the ingredients of an object
244	Locate	Use information in a table to identify the most frequent event
242	Infer/Evaluate	Use information in the text to infer the cause of an event
234	Locate	Recognise appropriate information about the action to be taken by a person
231	Infer/Evaluate	Use information in a story to make a simple inference about the cause of an act
231	Infer/Evaluate	Use information from a notice to make a simple inference about the participation in a sport
228	Infer/Evaluate	Use information in a story to make a simple inference about the cause of an act
225		(no item appeared at this difficulty level)
217	Grasp ideas/Interpret	Recognise the text type as a notice from the format and the content
213	Locate	Use information in a table to identify the time for a phenomenon
203	Locate	Use information in a table to identify phenomena occurring at a particular time

Note: Percent correct values from classical test theory are given in Appendix IV.

identify the relationship between a pronoun and the relevant object/person even when this is not immediately obvious. Furthermore, Table 3.1 of item map suggests that students at this level can identify the relationship between events, ideas and phenomena, and recognise the likely thoughts of characters in the text.

3.3 Sample Item and Reading Passage

The passage and items reproduced below were used in one of the tests of Reading Comprehension. Statistics showing how students responded to these items are given. These items can also be located on the item map.

Direction: Read the following passage carefully and answer the questions given below it. Encircle the number of the correct answer.

Millions of people in the world are blind. Formerly, people thought that blind people could not do anything. But nowadays, many blind schools have been opened. All these facilities are available to the blind for studying. Now many blind students are earning their livelihood after finishing their studies. Many blind people have become scholars in the world. Apart from this, the doctors are trying to prevent blindness among children by providing appropriate medical care and prescribing nutritious diet.

Today, many people donate their eyes. After their death, their eyes are transplanted in the blind people's eyes. Thus, many blind persons are able to see.

Sample item: Infer/Evaluate	**Scale score:** 247

Item 46.   Why do many people donate their eyes?
       1.   Their eyes are weak.
       2.   Blind people can become scholars.
       3.   Their eyes will enable a blind person to see.
       4. They want to become famous.	

This item requires students to make inference about the cause of an action. The scaled score of this item was 247, i.e., very close to the average level of difficulty of items in the Reading Comprehension survey. Around 52% of students in the sample were able to select the correct answer (3). The figure shows how the remaining 48% responded.

Figure 3.1 (Item 46): Percentage of students in each response category
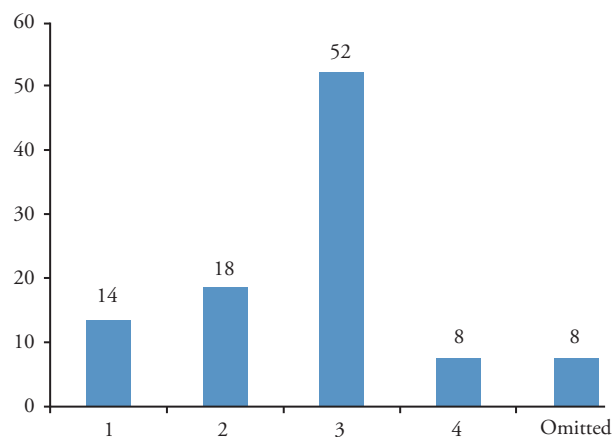
Sample item: Grasp ideas/Interpret **Scale score:** 293
Item 47. The blindness can be removed through 　　　　1.　nutritious diet. 　　　　2.　eye transplant. 　　　　3.　higher education. 　　　　4.　some training.

This item requires students to integrate and use the information given in the text to arrive at the solution to a problem. The scale score of this item was 293, i.e., significantly above than the average level of difficulty of items in the survey. Only 39% of students in the sample were able to select the correct answer (2). The figure shows how the remaining 61% responded.

Figure 3.2 (Item 47) : Percentage of students in each response category
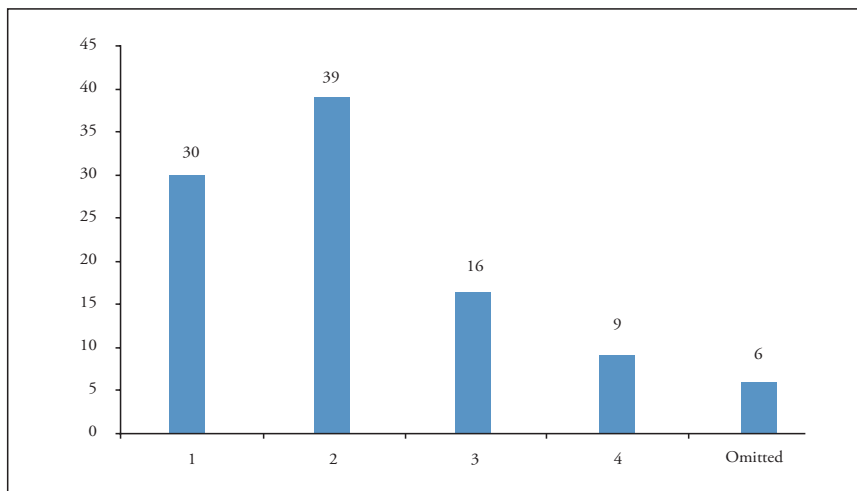
Sample item: Grasp ideas/Interpret **Scale score:** 292
Item 48. The blind can become scholars by 　　　　1.　taking nutritious diet. 　　　　2.　getting back their eyesight. 　　　　3.　eye transplant. 　　　　4.　studying hard.

This item requires students to grasp ideas and interpret the text to make an inference about the causal relationship of two events. The scale score of this item was 292, i.e., significantly above than the average level of difficulty of items in the survey. Only 40% of students in the sample were able to select the correct answer (4). The figure shows how the remaining 60% responded.

Figure 3.3 (Item 48): Percentage of students in each response category
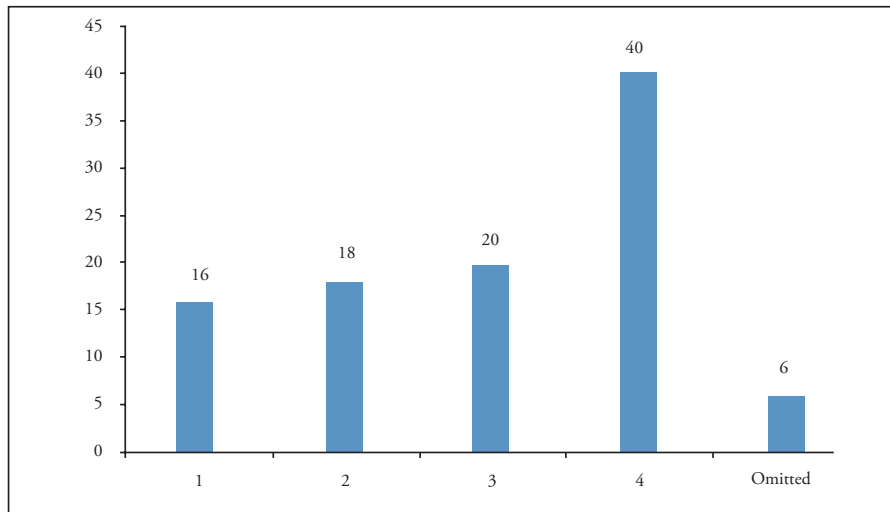
Sample item: Locate information	Scale score: 234

Item 49.   What can a doctor do to prevent blindness?
1.   Provide medical care.
2.   Train blind people.
3.   Provide nutritious diet.
4.   Turn the blind people into scholars.

This item requires students to locate a specific piece of information given explicitly in the text. The scale score of this item was 234, i.e., below the average level of difficulty of items in the Reading Comprehension survey. As many as 54% of students in the sample were able to select the correct answer (1). The figure shows how the remaining 46% responded.

Figure 3.4 (Item 49): Percentage of students in each response category
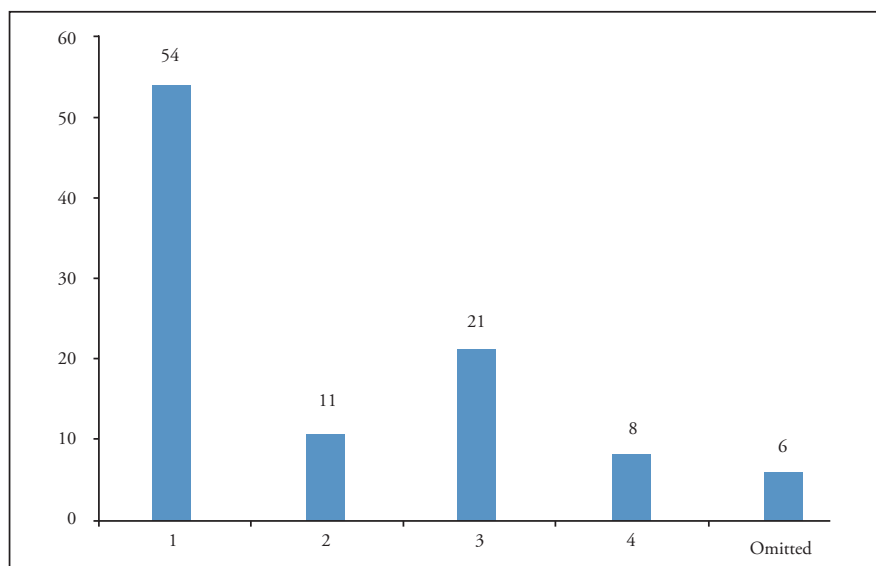
Sample item: Grasp ideas/Interpret	**Scale score:** 279

Item 50.   What did people think about the blind in the past?
      1.   There is no cure for blindness.
      2.   Blind can get training.
      3.   Blind cannot do anything.
      4. Blind can donate their eyes.	

The item requires students to interpret and grasp the relevant idea from the text. The scaled score of this item was 279, i.e., significantly above the average level of difficulty of items in the survey. Only 40% of students in the sample were able to select the correct answer (3). The figure shows how the remaining 60% responded.

Figure 3.5 (Item 50): Percentage of students in each response category
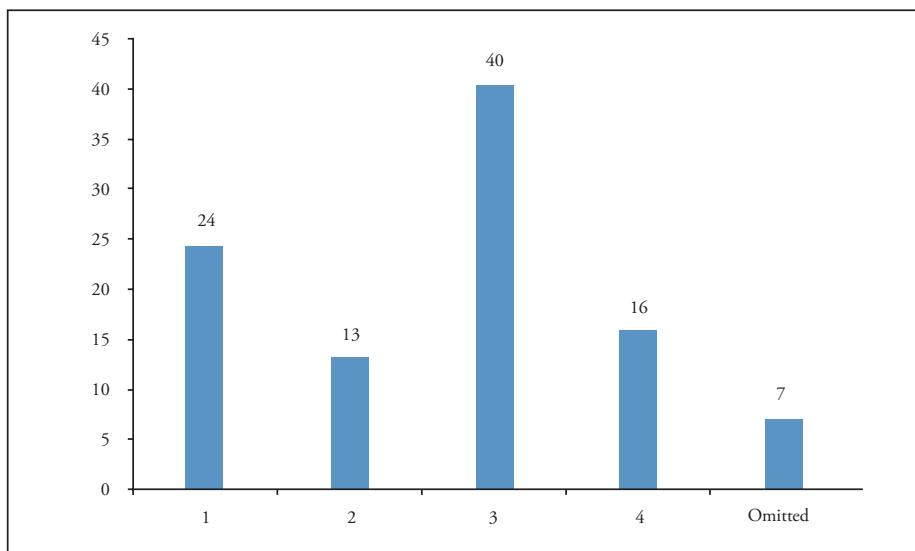
Performance on the sample items reproduced here (i.e., items 46–50) varied across the country. Table 3.2 shows the proportion of students in each state or UT correctly responding to each item. The states/UTs are grouped according to the language in which the reading texts were presented as some variation in performance may be due to translation effects.

Table 3.2: Performance on the sample items (46–50) in states and UTs

States and UTs	Medium	Item 46 (%)	Item 47 (%)	Item 48 (%)	Item 49 (%)	Item 50 (%)
All Sample		**52**	**39**	**41**	**54**	**40**
Tripura	Bengali	56	38	22	41	35
West Bengal**	Bengali	68	37	23	39	47
A & N Islands	English	41	32	38	40	30
Chandigarh	English	41	30	55	58	33
Goa*	English	37	42	36	52	46
Meghalaya**	English	47	39	34	53	43
Nagaland**	English	47	43	36	51	45
Sikkim**	English	41	40	27	52	35
Daman & Diu*	Gujarati	67	56	44	54	46

Gujarat	Gujarati	59	52	43	49	45
Bihar	Hindi	34	24	51	53	32
Chhattisgarh	Hindi	43	31	48	52	36
Delhi	Hindi	51	35	59	63	36
Haryana	Hindi	43	31	58	65	33
Himachal Pradesh	Hindi	43	26	54	58	33
Jharkhand**	Hindi	42	30	50	50	31
Madhya Pradesh	Hindi	53	45	42	52	38
Rajasthan	Hindi	51	41	51	50	33
Uttar Pradesh	Hindi	65	59	59	56	55
Uttarakhand	Hindi	39	30	51	55	30
Karnataka	Kannada	64	35	32	51	47
Kerala*	Malayalam	56	46	34	51	49
Maharashtra*	Marathi	68	42	48	48	57
Mizoram**	Mizo	77	73	51	61	45
Orissa	Oriya	52	33	31	49	42
Punjab	Punjabi	49	42	30	62	36
Puducherry	Tamil	33	---	25	50	26
Tamil Nadu	Tamil	62	---	19	66	44
Andhra Pradesh	Telugu	51	22	48	62	43
Assam	multiple	44	31	23	57	39
Jammu & Kashmir	multiple	57	42	34	57	34

1. Performance by states/UTs on the five items based on the reading passage about blindness.
2. States/UTs marked * achieved samples representing <80% of the target population.
3. States/UTs marked ** tested students in class VI.
4. Item 47 was deleted for Puducherry and Tamil Nadu because the characteristics for the translated item (Tamil) did not fit the IRT model.
5. Assam tested students in Assamese and Bengali. Jammu & Kashmir tested students in English, Hindi and Urdu.

3.4 What can students do in Reading Comprehension?

3.4.1 Locating information

In this chapter, it has already been mentioned what the students performing at different levels of scale scores of the Reading Comprehension items can do.

Table 3.3 shows the performance of class V students on the cognitive process **of locating information**.

Table 3.3: Performance of class V students on the cognitive process of locating information			
Item No.	**Locate information**	**Scale Value**	**% Correct**
20	Place name	279	41
28	Frequency of events	274	41
29		244	52
30		250	50
49	Action to be taken by a person	234	54
27	Time for a phenomenon	213	68
26	Identifying an event	203	71

- About 71% students can use information in a table to identify an event occurring at a particular time. However, only 41% students can determine the frequency of events and identify the place name from the given information.

3.4.2 Grasp ideas/Interpret

Table 3.4 shows the performance of class V students on the cognitive process of grasp ideas/interpret.

Item No.	Grasp ideas/Interpret	Scale Value	% Correct
16	Recognise the text type as a notice	217	63
21	Identify the ingredients of an object, identify the solution to a	244	52
47	problem	293	39
23	Draw simple conclusion about the usefulness of an object	246	51
19	Derive duration of an event, timing of an event	252	49
18		279	39
35	Determine the cause of an event	255	47
34		259	46
33	Grasp the problem, the idea about people's thinking	258	46
50		279	40
24	Determine the sequence of activities	264	43
22	Identify relationships	265	44
25		285	40
48		292	41
44		305	33

Table 3.4: Performance of class V students on the cognitive process of grasp ideas/interpret

- More than 60% students in the country can recognise the text type as a notice from the format and the content.
- Only one-third of the students can identify relationship between a pronoun and the object or person.
- About 50% students were able to draw simple conclusion about the usefulness of an object.

3.4.3 Infer/Evaluate

Table 3.5 shows the performance of class V students on the cognitive process of infer/evaluate.

Table 3.5: Performance of class V students on the cognitive process of infer/evaluate

Item No.	Infer/evaluate	Scale Value	% Correct
31	Make a simple inference about the cause of an event/act, about	228	60
17	the participation in a sport	231	58
32		231	59
46		247	51
41		242	52
43	Make complex inference about the effect of an activity on	247	50
42	concerned persons, about the quality of persons	249	50
45	Identify the main theme and evaluate the title	313	32

- Only one-third of the students are able to use information given in the text to identify the main theme and evaluate the title.

Chapter 4

Achievement of Students in Mathematics

CHAPTER 4 ACHIEVEMENT OF STUDENTS IN MATHEMATICS

This chapter summarises the achievement of class V students in Mathematics in the National Achievement Survey conducted in 2010. Overall achievement for each of the participating states and UTs is reported. In addition, information about differences in achievement by student gender, school location and social category is provided. In the majority of states, students nearing the end of class V were tested. However, in a few states, the arrangement of the school year meant that students had to be tested at the beginning of class VI. Results for these groups are presented separately to reduce the chance of readers inadvertently comparing different cohorts.

For each state, a sample was drawn which was designed to be representative of the entire target population, i.e., all class V students studying in government and government-aided schools. In most states, the sample coverage achieved was regarded as satisfactory as it covered more than 80% of the target population. However, in some states, local logistical challenges and resource constraints meant that this criterion was not fully met and so the sample coverage, although significant, was deemed 'inadequate'. To ensure that readers are aware of this when comparing achievement levels, results for states with adequate and inadequate sample coverage are reported separately.[1]

4.1 How did the states and UTs perform in Mathematics?

The distribution of student achievement in Mathematics for the 31 participating states is given in Tables 4.1, 4.2 and 4.3. Each table represents one of the three categories described above: those where class V students were tested and sample coverage was adequate; those where class V students were tested and sample coverage was less than adequate; and those where class VI students were tested. Within each group, states are listed in alphabetical order.

The tables list each state's average score on a scale from 0 to 500. For each score, the 'Standard Error' is given to indicate the degree of imprecision arising from the sampling process. Finally, where such comparisons are appropriate, the tables indicate whether a state's average score is significantly different from the group's average or not.

Table 4.1: Average Mathematics scores for states and UTs where class V students were tested and population coverage was >80%			
State or UT	**Average Score**	**Standard Error**	**Significant Difference**
A & N Islands	226	2.8	◐
Andhra Pradesh	238	2.2	◐
Bihar	242	3.4	◐
Chandigarh	229	2.0	◐
Chhattisgarh	232	3.4	◐
Delhi	260	3.4	◐
Gujarat	256	3.2	●
Haryana	240	2.5	◐
Himachal Pradesh	243	2.4	◐
Jammu & Kashmir	262	2.9	◐

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1   This follows the practice adopted in international surveys such as TIMSS and PISA where countries that do not meet sampling requirements are reported 'below the line'.

Karnataka	269	2.9	☍
Madhya Pradesh	265	3.5	☍
Orissa	257	3.0	●
Puducherry	217	3.6	☋
Punjab	252	2.6	●
Rajasthan	257	3.2	●
Tamil Nadu	279	2.8	☍
Tripura	260	3.0	☍
Uttar Pradesh	298	3.1	☍
Uttarakhand	241	2.7	☋
Group Average	**251**	**0.7**	

● The state's average score is not significantly different from that of the group.
☍ The state's average score is significantly above that of the group.
☋ The state's average score is significantly below that of the group.

The 20 states and UTs represented in Table 4.1 are those in which class V students were tested and where the sample covered at least 80% of the target population. The average score for this group was 251 (with a standard error of 0.7).

The results reveal substantial differences in Mathematics achievement between the highest performing states (298 for Uttar Pradesh and 279 for Tamil Nadu) and the lowest performing states/UTs (217 for Puducherry and 226 for the Andaman and Nicobar Islands). In Mathematics, seven states had average scores significantly above that of the group; nine states had average scores significantly below that of the group; and four states had average scores that were not significantly different from that of the group.

Table 4.2: Average Mathematics scores for states and UTs where class V students were tested and population coverage was <80%			
State or UT	**Average Score**	**Standard Error**	**Significant Difference**
Assam	241	2.3	☋
Daman & Diu	259	5.7	●
Goa	241	3.9	☋
Kerala	244	1.5	☋
Maharashtra	264	3.1	☍
Group Average	**250**	**1.6**	

● The state's average score is not significantly different from that of the group.
☍ The state's average score is significantly above that of the group.
☋ The state's average score is significantly below that of the group.

The five states and UTs represented in Table 4.2 are those in which class V students were tested but where the sample covered less than 80% of the target population. For this group, great care should be taken when considering an average score or comparing it with that of other states as it may not be a reliable measure for the whole state/UT.

Table 4.3: Average Mathematics scores for states where class VI students were tested			
State or UT	**Average Score**	**Standard Error**	**Significant Difference**
Jharkhand	247	3.0	●
Meghalaya	244	2.9	●
Mizoram	233	1.0	☋

Nagaland	251	3.5	●
Sikkim	234	1.8	↻
West Bengal	267	2.4	∩
Group Average	**246**	**1.1**	

● The state's average score is not significantly different from that of the group.
∩ The state's average score is significantly above that of the group.
↻ The state's average score is significantly below that of the group.

The six states represented in Table 4.3 are those in which, due to local circumstances, class VI students had to be tested. For this group, the average Mathematics score was 246 (Standard Error 1.1). West Bengal performed significantly better than the group average whereas the average scores of Sikkim and Mizoram were significantly below the group average.

4.1.1 How did scores vary within states and UTs?

Tables 4.4, 4.5 and 4.6 and Figures 4.1, 4.2 and 4.3 illustrate the range of achievement within states and across groups of states. The tables list the scores achieved by students at key percentiles. For example, the score at the 25th percentile is the score which 75% of students achieve or surpass; the score at the 90th percentile is the score that 10% of students achieve or surpass.

The range between the 25th and 75th percentiles (the inter-quartile range) represents the performance of the middle 50% of students. Hence, this is a good indicator of the state's degree of homogeneity in terms of the achievement of its students in Mathematics.

Table 4.4: Percentile scores in Mathematics for states and UTs where class V students were tested and where adequate population coverage was achieved							
State or UT	**10th percentile**	**25th percentile**	**50th percentile**	**75th percentile**	**90th percentile**	**Range 75–25**	**Range 90–10**
A & N Islands	182	200	224	237	276	37	94
Andhra Pradesh	185	212	228	271	291	59	107
Bihar	178	204	230	275	321	71	143
Chandigarh	185	212	226	248	273	36	88
Chhattisgarh	165	200	226	269	316	69	151
Delhi	201	226	262	292	325	66	124
Gujarat	194	224	255	287	320	63	126
Haryana	183	212	229	271	305	59	122
Himachal Pradesh	187	220	233	273	301	52	114
Jammu & Kashmir	189	225	268	303	333	78	144
Karnataka	206	228	273	308	331	81	125
Madhya Pradesh	202	227	270	302	329	75	126
Orissa	186	222	253	298	329	75	143
Puducherry	179	187	216	227	265	40	86
Punjab	191	225	250	276	314	51	123
Rajasthan	190	224	257	288	324	64	133
Tamil Nadu	224	234	275	318	342	84	118
Tripura	184	225	268	305	336	80	151
Uttar Pradesh	223	261	310	346	377	85	154
Uttarakhand	182	212	230	273	306	62	124
Group Distribution	**191**	**219**	**249**	**283**	**316**	**64**	**125**

Note: Ranges may not agree due to rounding.

Figure 4.1: Percentile scores in Mathematics for states and UTs where class V students were tested and where adequate population coverage was achieved
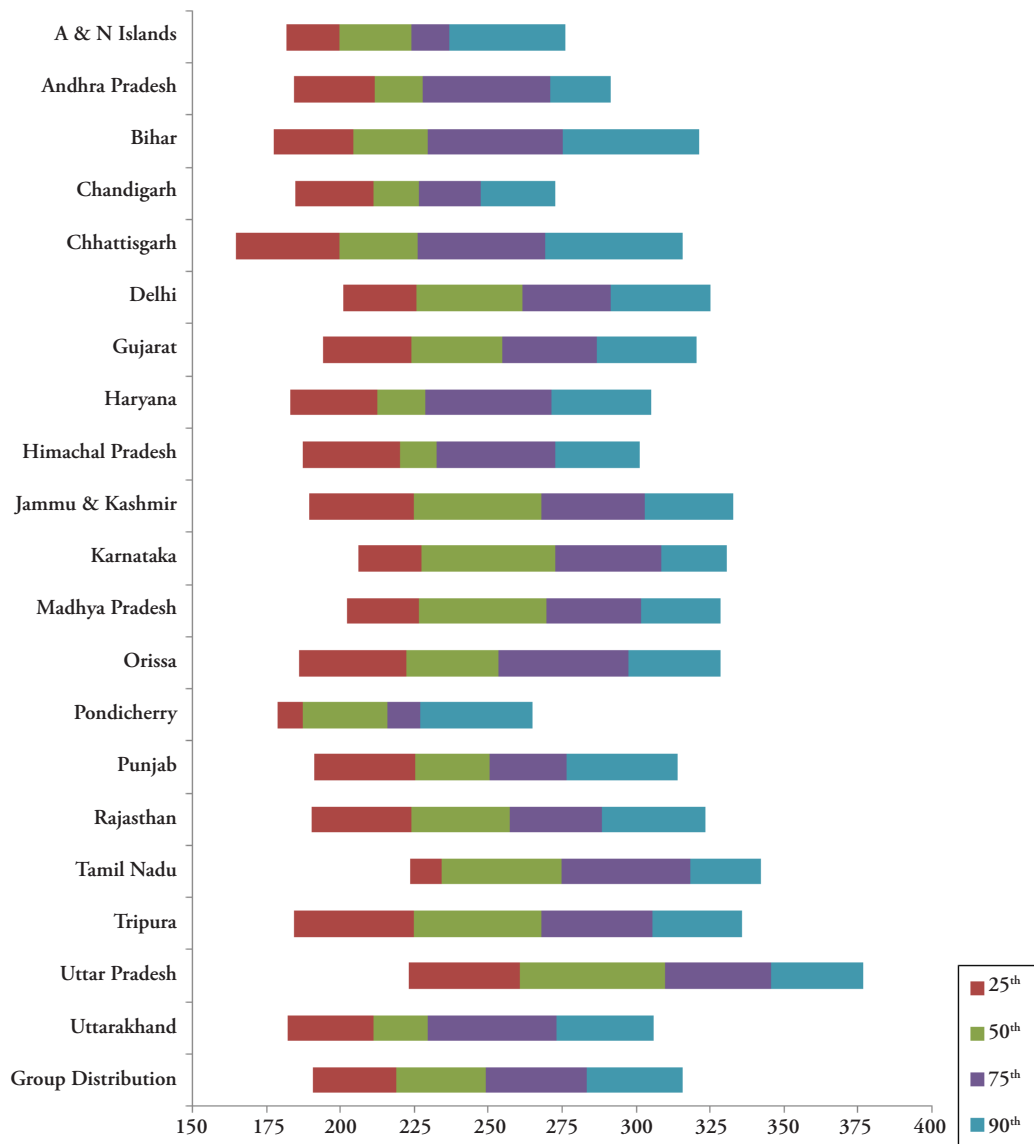
The figure shows that the inter-quartile range is highly variable. For example, Chandigarh has an inter-quartile range of just 36 whilst Uttar Pradesh has a corresponding value of 85. These values suggest that in terms of Mathematics achievement, the class V population in Chandigarh is far more homogeneous than that of Uttar Pradesh. In most states, the range of performance for the middle group was between 50 and 80 scale-score points. Performance at the 10th and 90th percentiles respectively shows extremes in low and high achievement. The range between these two points, which includes 90 percent of the population, is highly variable ranging from 86 (Puducherry) to 154 (Uttar Pradesh).

The percentiles provide additional information when comparing Mathematics performance amongst states. For example, when the states are arranged in order of average score, the differences between adjacent states tend to be small. However, the range of scores may not be similar. For example, there is no significant difference between the average score of Bihar (242) and Andhra Pradesh (238). However, the score ranges between the 25th and 75th percentiles are very different: Bihar's range is 71 compared with Andhra Pradesh's range of 59. This indicates that whilst average performance in the two states is approximately the same, the class V cohort in Bihar is more diverse in its mathematical achievement.

Table 4.5: Percentile scores in Mathematics for states and UTs where class V students were tested and achieved population coverage was <80%

State or UT	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Range 75−25	Range 90−10
Assam	182	212	228	273	312	62	130
Daman & Diu	206	225	256	291	324	65	118
Goa	189	219	230	269	291	51	101
Kerala	198	224	234	272	288	48	90
Maharashtra	203	226	268	299	331	72	128
Group Distribution	**195**	**221**	**243**	**281**	**309**	**60**	**113**

Figure 4.2: Percentile scores in Mathematics for states where class V students were tested and where population coverage was <80%
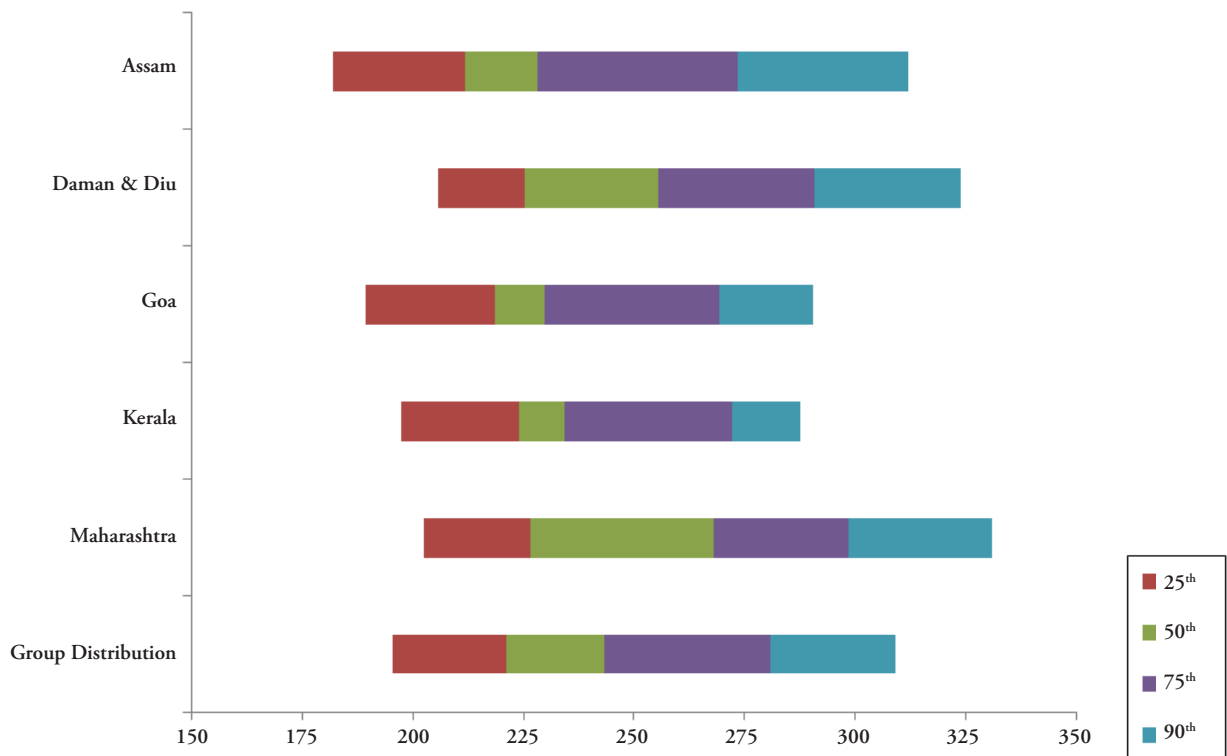
Table 4.6: Percentile scores in Mathematics for states where class VI students were tested

State or UT	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Range 75−25	Range 90−10
Jharkhand	180	215	234	279	324	64	143
Meghalaya	194	222	230	272	310	50	117
Mizoram	196	221	227	248	273	27	76
Nagaland	187	219	236	282	324	62	138
Sikkim	197	223	228	256	273	33	76
West Bengal	211	227	270	299	332	71	122
Group Distribution	**194**	**221**	**238**	**272**	**306**	**51**	**112**

Figure 4.3: Percentile scores in Mathematics states where class VI students were tested
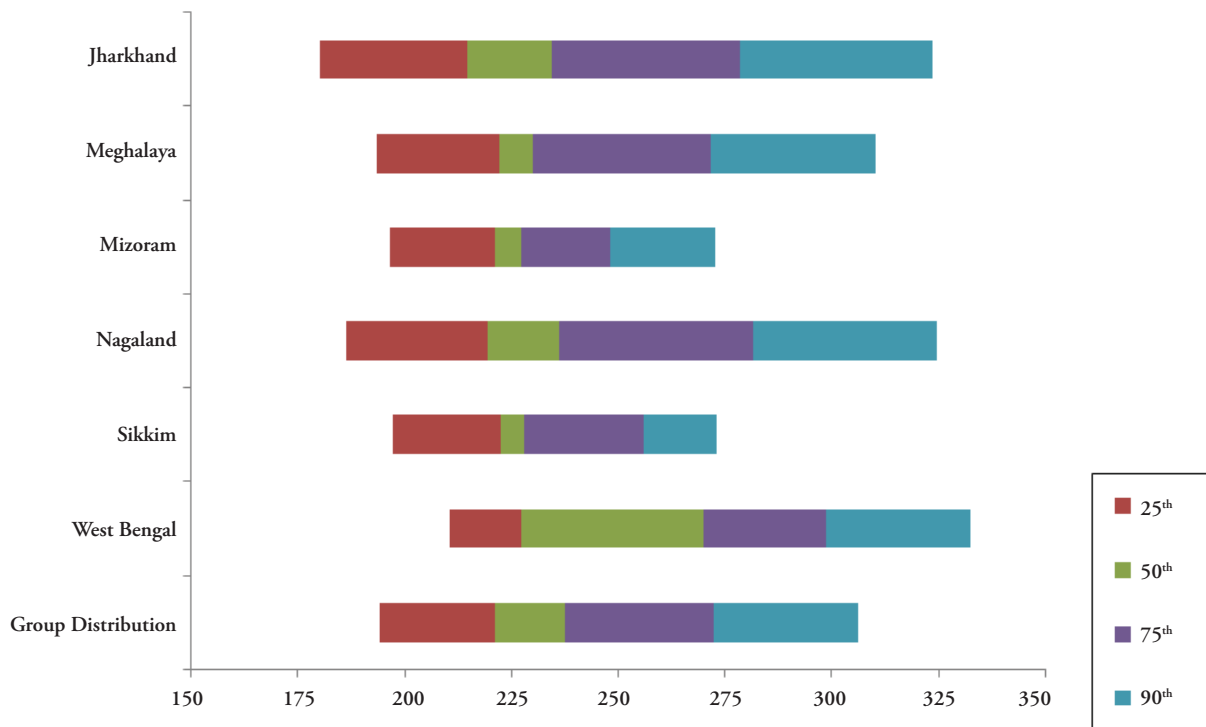
The inter-quartile range for the states where class VI students were tested varied considerably from about 27 scale points in Mizoram to 71 points in West Bengal. The range of scale points covering the population from the 10th to the 90th percentile (i.e., the range which includes 90 percent of the population) varied dramatically from the highly diverse state of Jharkhand (143) to Sikkim (76) where relatively little difference between high and low performing students was detected.

Interestingly, the data shows that whilst West Bengal has by far the highest median performance (270) in this group, Nagaland and Jharkhand have scores at the 90th percentile which are comparable to that of West Bengal (324 cf. 332). This suggests that high achieving students in Nagaland and Jharkhand are not lagging behind their peers in West Bengal.

4.2 How did various groups perform in Mathematics?

The tables below compare the average performances of different groups. Performance is compared by gender, by school location and by social category. (The quoted scores were calculated for the 20 states and UTs where students were tested in class V and satisfactory coverage of the population was achieved. This was to ensure that comparisons were made with the most reliable class V available).

Table 4.7: Average Mathematics scores for groups by gender and by location (class V)

		Average Score	Standard Error	Significant Difference
Gender	Girls (N=28445)	252	0.7	●
	Boys (N= 27337)	251	0.8	

● No significant difference between the average performance of girls and boys.

Analysis of the results of 55,782 students within the states/UTs where adequate samples were achieved shows that there is no statistically significant difference in the average achievement levels of girls and boys in Mathematics.

4.2.1 Are there any gender differences in Mathematics achievement at the state level?

As seen in Table 4.7, there is no significant difference in the average performance of girls and boys in Mathematics. Tables 4.8, 4.9 and 4.10 show that the general result holds for all states and UTs

Table 4.8: Average Mathematics scores, by gender, for states and UTs where class V students were tested and population coverage >80% was achieved			
State or UT	**Boys' Average (SE)**	**Girls' Average (SE)**	**Significant Difference**
A & N Islands	224 (2.8)	228 (3.1)	●
Andhra Pradesh	236 (2.3)	239 (2.6)	●
Bihar	244 (3.1)	240 (4.3)	●
Chandigarh	231 (2.2)	227 (2.2)	●
Chhattisgarh	231 (3.5)	233 (4.0)	●
Delhi	264 (4.3)	258 (5.0)	●
Gujarat	255 (3.3)	258 (3.9)	●
Haryana	242 (2.9)	238 (2.7)	●
Himachal Pradesh	243 (2.5)	244 (2.6)	●
Jammu & Kashmir	263 (3.0)	262 (3.5)	●
Karnataka	269 (3.0)	269 (3.4)	●
Madhya Pradesh	266 (3.9)	265 (4.3)	●
Orissa	257 (3.2)	257 (3.6)	●
Puducherry	212 (1.9)	222 (6.4)	●
Punjab	254 (2.7)	250 (2.9)	●
Rajasthan	258 (3.7)	256 (3.1)	●
Tamil Nadu	279 (3.0)	280 (3.1)	●
Tripura	261 (3.2)	260 (3.6)	●
Uttar Pradesh	302 (3.8)	295 (3.4)	●
Uttarakhand	243 (2.8)	239 (3.0)	●
Group Average	**252 (0.7)**	**251 (0.8)**	●

● No significant difference between the average performance of girls and boys.

There is no significant difference in the average performance of girls and boys in Mathematics in any of the states/ UTs where class V students were tested and where population coverage was adequate.

Table 4.9: Average Mathematics scores, by gender, for states and UTs where class V students were tested and population coverage was <80%			
State or Union Territory	**Boys' Average (SE)**	**Girls' Average (SE)**	**Significant Difference**
Assam	242 (2.3)	240 (2.7)	●
Daman & Diu	259 (6.2)	259 (6.2)	●
Goa	238 (4.3)	244 (4.8)	●
Kerala	245 (2.0)	243 (1.6)	●
Maharashtra	265 (3.1)	263 (3.2)	●

● No significant difference between the average performance of girls and boys.

The data in Table 4.9 shows that there is no significant difference in the average performance of girls and boys in Mathematics in any of the states/UTs where class V students were tested and where adequate population coverage (>80%) was achieved.

Table 4.10: Average Mathematics scores, by gender, for states and UTs where class VI students were tested			
State or UT	**Boys' Average (SE)**	**Girls' Average (SE)**	**Significant Difference**
Jharkhand	252(3.6)	243 (3.1)	☋
Meghalaya	245 (3.1)	243 (2.9)	●
Mizoram	233(1.3)	232 (1.1)	●
Nagaland	255 (3.6)	253 (3.9)	●
Sikkim	239 (2.0)	230 (1.7)	☋
West Bengal	269 (3.1)	265 (3.2)	●
Group Average	**249 (1.2)**	**244 (1.1)**	☋

● No significant difference between the average performance of girls and boys.
☋ Significant difference between the average performance of girls and boys favouring boys.

Table 4.10 shows that in Jharkhand and Sikkim, (where Class VI students were tested), significant differences were detected in the average scores of girls and boys, with boys outperforming girls in both cases.

4.2.2 Are there any differences in Mathematics achievement related to school location?

Table 4.11 compares the average Mathematics scores achieved by students in rural and urban schools. It shows that within this group of states, no significant difference was detected in the average achievement levels of the two groups.

Table 4.11: Average Mathematics scores for groups by location (class V)				
		Average Score	**Standard Error**	**Significant Difference**
School location	Rural (N=42297)	252	0.8	●
	Urban (N= 13802)	250	1.9	

● No significant difference was observed in the average achievement of urban and rural schools.

Tables 4.12, 4.13 and 4.14 show average Mathematics scores by states/UTs and by location of school.

Table 4.12: Average Mathematics scores, by location, for states and UTs where class V students were tested and population coverage was >80%			
State or UT	**Rural Average (SE)**	**Urban Average (SE)**	**Significant Difference**
A & N Islands	234 (3.9)	215 (2.8)	☋
Andhra Pradesh	238 (2.6)	239 (4.6)	●
Bihar	242 (3.4)	249 (15.5)	●
Chandigarh	230 (3)	229 (2.6)	●
Chhattisgarh	232 (4.2)	233 (10.3)	●
Delhi	267 (7.1)	259 (4.2)	●
Gujarat	256 (3.5)	256 (7.6)	●
Haryana	241 (2.8)	232 (4.6)	●
Himachal Pradesh	243 (2.5)	246 (7.7)	●

Jammu & Kashmir	264 (2.9)	248 (13.5)	●
Karnataka	273 (3.3)	260 (5.9)	●
Madhya Pradesh	265 (3.7)	267 (12)	●
Orissa	254 (3)	273 (11.2)	●
Puducherry	215 (3)	221 (8.6)	●
Punjab	251 (3.1)	255 (5.5)	●
Rajasthan	256 (3.7)	258 (6.4)	●
Tamil Nadu	277 (3.3)	284 (5.4)	●
Tripura	257 (3.4)	279 (6.2)	☋
Uttar Pradesh	300 (3.9)	280 (13)	●
Uttarakhand	242 (2.7)	229 (6.8)	●
Group Average	**252 (0.8)**	**251 (1.9)**	●

● No significant difference between the average performance in rural and urban students.
☊ Rural students' average performance is significantly greater than that of urban students.
☋ Rural students' average performance is significantly lower than that of the urban students.

Table 4.12 reveals that there was no significant difference in average Mathematics of students from rural and urban schools with two exceptions. In the case of the Andaman & Nicobar Islands, students from rural schools outperformed those from urban schools by a significant margin (mean scores of 234 and 215 respectively). Conversely, in Tripura, students in urban schools had a significantly higher average score than their peers in rural schools (mean scores of 279 and 257 respectively).

Table 4.13: Average Mathematics scores, by location, for states and UTs where class V students were tested and population coverage was <80%			
State or UT	**Rural Average (SE)**	**Urban Average (SE)**	**Significant Difference**
Assam	241 (2.6)	240 (6.1)	●
Daman & Diu	263 (6.3)	244 (10.6)	●
Goa	233 (3.6)	256 (8.2)	☋
Kerala	244 (1.7)	242 (4)	●
Maharashtra	267 (3.5)	258 (6)	●

● No significant difference between the average performance of girls and boys.
☋ Rural students' average performance is significantly lower than that of the urban students.

Table 4.13 generally reinforces the data that suggests that there is no significant difference between Mathematics performance in rural and urban schools. Goa is a possible exception since, for this sample, urban students have outperformed rural students by a significant margin (256 cf. 233). However, given that population coverage here was less than 80%, this result should be treated with some caution.

Table 4.14: Average Mathematics scores, by location, for states where class VI students were tested			
State	**Rural Average (SE)**	**Urban Average (SE)**	**Significant Difference**
Jharkhand	246 (3.4)	251 (6.6)	●
Meghalaya	246 (3.3)	240 (5.8)	●
Mizoram	231 (1.3)	235 (1.4)	●
Nagaland	256 (4.0)	234 (7.7)	☊

Sikkim	232 (2.1)	243 (2.9)	☋
West Bengal	266 (2.7)	271 (5.9)	●
Group Average	**246 (1.2)**	**246 (2.2)**	●

● No significant difference between the average performance of girls and boys.
☊ Rural students' average performance is significantly greater than that of urban students.
☋ Rural students' average performance is significantly lower than that of the urban students.

Table 4.14 tends to confirm the view that, overall, these is little or no significant difference in achievement of students in urban or rural schools. Sikkim (where urban students appear to do better than those in urban schools) is one exception. However, the most notable exception is that of Nagaland where the absolute difference (22 scale scores) in favour of rural schools is very large.

4.2.3 Are there any differences in Mathematics achievement related to social category?

Table 4.15 below compares the average Mathematics scores achieved by students in different social categories. It shows that students in the General category achieved significantly higher average scores than those in other categories. Students classified as being in the OBC category significantly outperformed those in the ST category. No significant difference was detected in the average achievement levels of students in the SC and ST categories.

Table 4.15: Average Mathematics scores for groups by social category (class V)					
Category	**Average (SE)**	**SC**	**ST**	**OBC**	**General**
SC	247 (1.2)	–	●	☋	☋
ST	245 (1.5)	●	–	☋	☋
OBC	251 (1.0)	☊	☊	–	☋
General	257 (1.2)	☊	☊	☊	–

● The average scores of the two categories being compared are not significantly different.
☊ The average scores of the category in the first column is significantly higher than that of the category with which it is being compared.
☋ The average score of the category given in the first column is significantly lower than that of the category with which it is being compared.

4.3 Conclusion

The average Mathematics achievement of students varies greatly across the states and UTs of India. There is a great difference in outcomes in the group of high scoring states such as Uttar Pradesh (298), Tamil Nadu (279) and Karnataka (269) and the low scoring states/UTs such as Puducherry (217), Andaman & Nicobar Islands (226) and Chandigarh (229).

States also vary greatly in the range between their lowest and highest achieving students as revealed by their inter-quartile score ranges. Some states/UTs, e.g., Chandigarh (36), Andaman & Nicobar Islands (37) and Puducherry (40) have relatively homogeneous cohorts whilst others—Uttar Pradesh (85), Tamil Nadu (84) and Karnataka (81)—have far more diverse outcomes. Therefore, when looking at Mathematics performance within a state/UT, it is important to consider not only the average score, but also the distribution of percentile scores.

Overall, the survey found no significant difference in the average achievement of class V girls and boys studying Mathematics in government and government-aided schools. Some readers may be surprised by this finding. However, the large sample size (>55.000) and the consistency of results across states suggest that this is a robust conclusion.

Similarly, with a few exceptions, no significant difference was detected between the average achievement level in Mathematics of rural and urban students. In cases such as Tripura (favouring rural) and the Andaman & Nicobar Islands (favouring urban), further investigations may be necessary at the local level to explain these exceptional outcomes.

Data from the survey confirms that overall, in Mathematics, students from the General category outperform their peers in the SC, ST and OBC categories by a statistically significant margin.

The chapter which follows provides more information about what class V students at various levels of achievement know and can do in the domain of Mathematics.

Chapter 5

Mathematics: What Students Know and Can Do

CHAPTER 5 MATHEMATICS: WHAT STUDENTS KNOW AND CAN DO

5.1 Overview of the Mathematics tests

The Mathematics achievement survey given to class V students consisted of three test booklets, each containing 40, four-option multiple choice items. Twenty items were common across all test forms. These served as 'anchors' so that the different test booklets could be linked together and hence, all items could be placed on a common scale. In total, the Mathematics assessment instrument comprised 80 unique items.

The items in each text booklet were chosen to cover the following range of mathematical domains from the Mathematics curriculum: the number system, basic operations, measurement, geometry and patterns. In addition to the content domains listed above, items were constructed to test a range of cognitive processes or skills in a variety of contexts. These were classified as Knowing 'Skill 1', Applying 'Skill 2' and Reasoning 'Skill 3' as described below:

Skills classification for test construction in Mathematics

Knowing (Skill 1): In items testing this process, students are expected to answer using simple knowledge (recall) or recognition of terms and/or concepts familiar from their lessons. This skill also includes the application of basic operations in straightforward tasks.

Applying (Skill 2): In items testing this process, students are expected to solve non-complex problems set in familiar situations by way of simple application of the operations/concepts learned in class V.

Reasoning (Skill 3): In items testing this process, students are expected to use Mathematics concepts, principles, facts, etc. learned in the class in new or less familiar situations. In particular, students are expected to apply their Mathematical abilities to solving real world problems.

5.2 Item Mapping

Following testing, the responses of students to the various Mathematics tasks were analysed using Item Response Theory (see Appendix II). The three test forms were then aligned using the anchor items, thereby placing all items on a single Mathematics achievement scale comprising scores from 0 to 500. On this scale, the mean score was set at 250 with a standard deviation of 50. Calibrating the items according to their levels of difficulty places them on an 'item map' with the more demanding items at the top and the easiest items at the bottom. Such item maps give us a picture as to what students at different levels of ability know and can do.

The map for selected items from the Mathematics tests is given below. The scale score in the first column shows the level of difficulty for each item. Perhaps more importantly, this score also represents the minimum score on the ability scale necessary for a student to have an even (i.e., 50:50) chance of success on the item. The map (Table 5.1) also includes a brief description of what students needed to do to answer the item correctly.

Scale Score	Mental Processes	Question Description
...		
325	Applying	Addition of two fractions
321	Reasoning	Calculate the perimeter of squares *
...		
304	Reasoning	Calculate the difference between two decimal numbers*
300		(no item appeared at this difficulty level)
292	Reasoning	Identify smallest number divisible by two single digit numbers
290	Applying	Identify the difference between fractions
289	Reasoning	Can subtract distance given in different units
280	Reasoning	Find the difference between numbers after changing position of digits*
278	Reasoning	Solve money problems involving fractions
277	Reasoning	Solve an equation with one unknown
275	Reasoning	**Calculate an average of given values**
267	Applying	Calculate the radius of a circle from given information *
266	Applying	Calculate the perimeter of a square of given side
262	Applying	Identify the largest number made from given three digits*
261	Applying	Calculate the difference described in word problem*
260	Applying	Able to convert minutes into hours
258	Applying	Find the difference between two large numbers
257	Applying	Identify the smallest angle in a given figure
254	Applying	Select appropriate units for measuring length
250	Applying	**Identify 45º as 'half of a right angle'**
249	Applying	Calculate the area of a rectangle
248	Applying	Calculate the period between two given times
245	Applying	Find the difference between two digits in a number
244	Applying	Calculate the number of hours in a week
240	Applying	Multiply two digit numbers
237	Knowing	Find the angle between the hands of a clock
232	Applying	Solve the word 'problem'
228	Applying	Multiply two given numbers
225		(no item appeared at this difficulty level)
224	Knowing	Convert volume of liquid into different units
223	Knowing	Find the place value of a digit in given number*
214	Applying	Calculate time period from a given clock
208	Knowing	Identify the rectangle among given shapes*
205	Applying	Understand the conversion of metres and centimeters
200		(no item appeared at this difficulty level)
184	Applying	Add two four–digit numbers*
168	Knowing	Identify the triangle among given shapes

Items marked with an asterisk (*) are given as examples at the end of this chapter together with information as to how students performed.

Note: Percent correct values from classical test theory are given in Appendix IV.

Items ranged in difficulty from the easiest with a scale score of 168 (recognising a triangle amongst other geometrical shapes) to the most difficult with a scale score of 422 (comparing three fractions in an authentic context). Using the item map and similar information for all the other test items, descriptions of what students know and can do at different levels of ability can be developed. Such descriptions based on evidence from the survey are given below. In addition, exemplar items are given to help subject teachers understand the statements.

Students performing at the lower end of the ability scale, i.e., those with scale scores in the range of, say, 175 to 230, can:

- demonstrate basic mathematical knowledge, e.g., they know the place value of digits in the number system and can recognise geometrical shapes; and
- apply fundamental concepts and perform basic operations in simple situations, e.g., they can use familiar units of time and linear measure, and can perform one step calculations involving whole numbers.

Students performing in the intermediate range of the scale, i.e., those with scale scores in the range of, say, 230 to 275, can do more. In addition to that described above, they can:

- perform a wider range of mathematical operations including multiplication and division;
- work with basic units and, where necessary, transform units such as g and kg, m and km, hours and minutes, etc.; and
- apply their knowledge to a range of problems set in authentic contexts (e.g., money calculations in the market) provided that the context is clear.

Students performing at higher end of the scale, i.e., those with scale scores above, say, 275, can do still more. In addition to that described above, they can:

- apply most or all of the mathematical operations required by the curriculum;
- demonstrate understanding of fractions and fractional notation by comparing their sizes etc.;
- add decimal fractions and work confidently in a range of physical units including those of area; and
- solve more complex problems including authentic tasks such as those involving time and money calculations—even when these are set in less familiar contexts.

5.3 Sample Items

The sample items given below are intended to exemplify student achievement in selected mathematical domains at three distinct levels within the ability range. For each item, the proportion of students choosing the correct answer (marked *) and each of the incorrect options is given. A table at the end of this section shows the proportion of students selecting the correct answer within each participating state/UT.

5.3.1 Number system

Sample item: Find Place Value	**Scale score:** 223 (easy)
Item 71. The place value of 4 in 294301 is…	
1. 4 2. 40	
3. 400 4. 4000	

This item requires student to find out place value of a digit in a given number. The scale value of the item is 223, significantly below average difficulty of all items used in the survey. A total of 61% students have identified the correct answer as (4). The figure shows distribution of remaining 39% responses.

Figure 5.1 (Item 71): Percentage of students in each response category
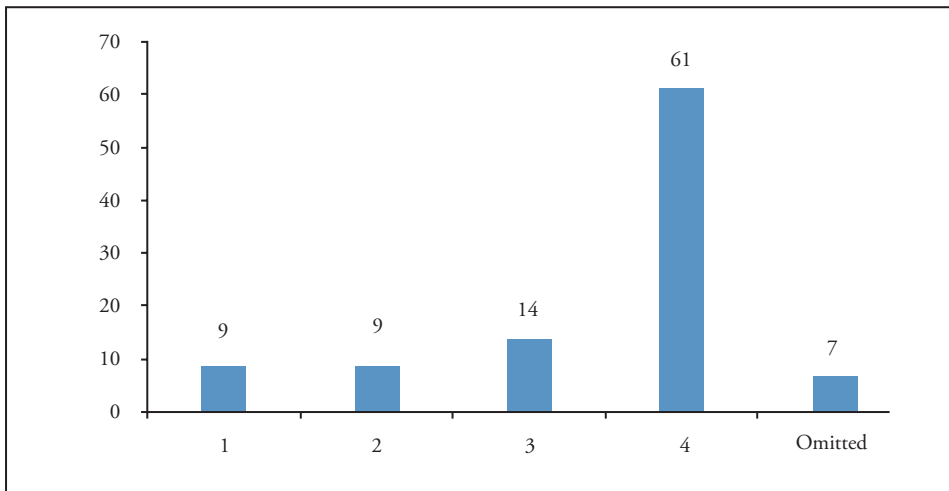
Sample item: Find largest number	Scale score: 262 (intermediate)

Item 3.   Renu has the following three number cards:

7		5		8

Which is the largest 3-digit number she can make using all cards?

1.   578   2.   857
3.   875   4.   999

This item requires student to form the largest three digit number using all three numbers written in cards. The scale value of the item is 262, i.e., close to the average difficulty of all items in the survey. In this item, 45% of students chose the correct answer as (3). Note that 37% chose incorrect option (4) which is the largest three digit number but is not made using the given numbers. The figure shows the remaining 18% responses.

Figure 5.2 (Item 3): Percentage of students in each response category
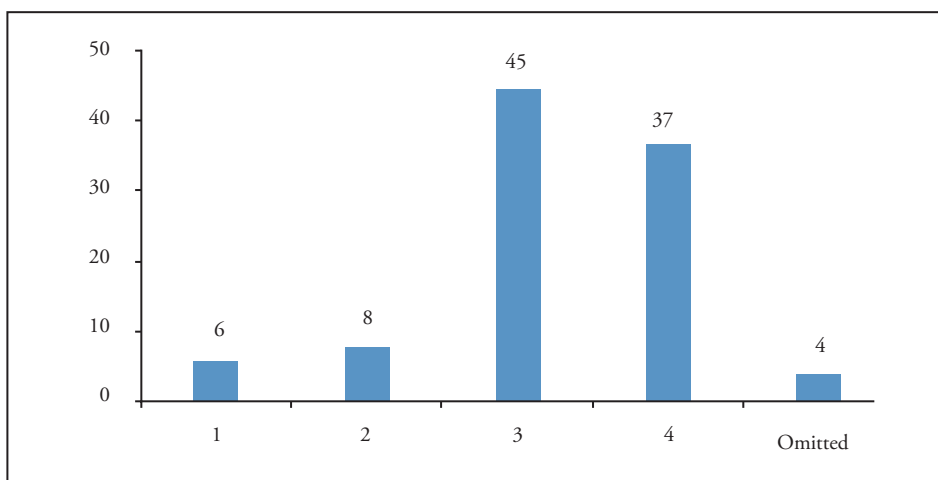
Sample item: Number difference	Scale score: 280 (hard)

Item 49.   The digits 3 and 4 of the number 354 are inter-changed to form a new number. What is the difference between the new number and the original number?

1.   99   2.   101
3.   109   4.   199

This item requires students to not only transform a given number, but also calculate simple difference of numbers. The scale value of the item is 280, significantly above average difficulty of all items used in the survey. A total of 40% students have identified the correct answer as (1). The figure shows distribution of remaining 60% responses.

Figure 5.3 (Item 49): Percentage of students in each response category
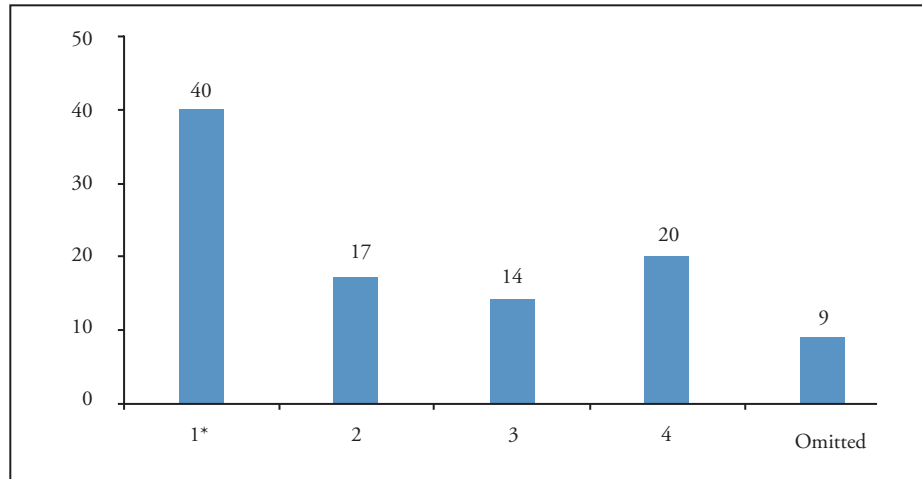
5.3.2 Computations (Operations)

Sample item: Calculation	Scale score: 184 (easy)
Item 44. 7010 + 2699 ? 1. 9799 2. 9709 3. 9699 4. 9609	

This item requires students to calculate simple addition with carrying of two four-digit numbers. The scale value of the item is 184, significantly below average difficulty of all items used in the survey. A total of 76% students have identified the correct answer as (2). The figure depicts distribution of remaining 24% responses.

Figure 5.4 (Item 44): Percentage of students in each response category
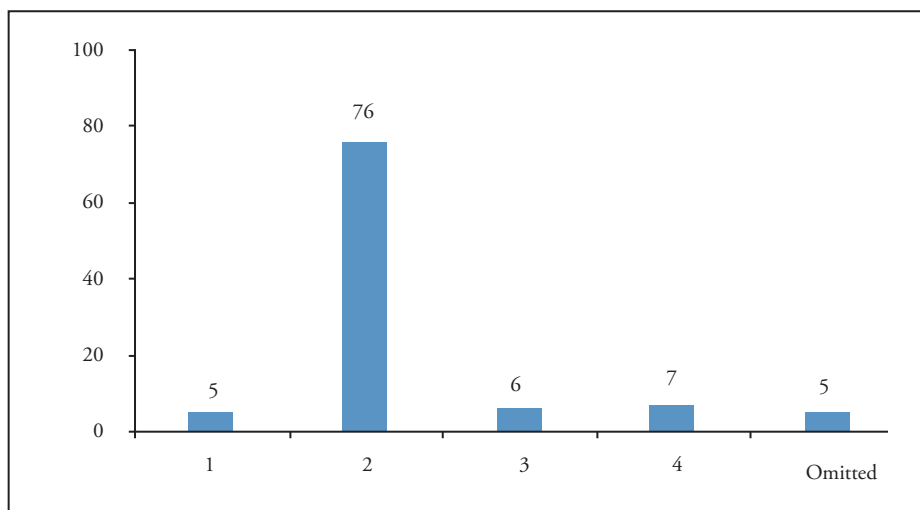
Sample item: Calculate the difference	**Scale score:** 261 (intermediate)
Item 45. How much greater is 555 than 198?	

1. 357	2. 358
3. 367	4. 753

This item requires students to calculate the difference satisfying the given condition. The scale value of the item is 261 which is close to the average difficulty of all items used in the survey. In this item, 45% of students chose the correct answer (1). Note that 26% chose incorrect option (4) which is the sum of 555 and 198 rather than the difference. The figure shows how the remaining 29% responded.

Figure 5.5 (Item 45): Percentage of students in each response category
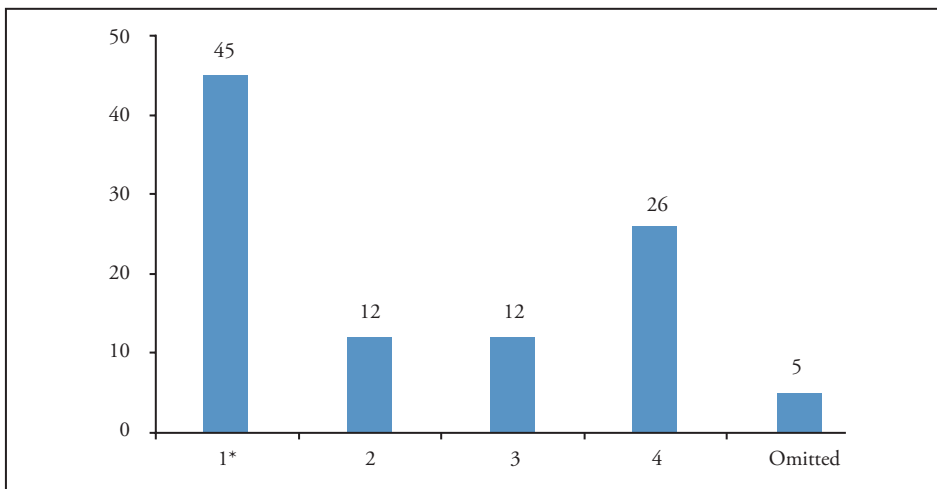
Sample item: Calculate the difference in decimal numbers	**Scale score:** 304 (hard)
Item 28. What is the difference between 500.2 and 499.101?	

1. 1.099	2. 1.101
3. 1.109	4. 1.99

This item requires student to calculate difference between two decimal numbers. The scale value of the item is 304, significantly above average difficulty of all items used in the survey. A total of 34% students have identified the correct answer as (1). The figure depicts distribution of remaining 66% responses.
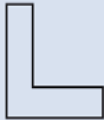
Figure 5.6 (Item 28): Percentage of students in each response category
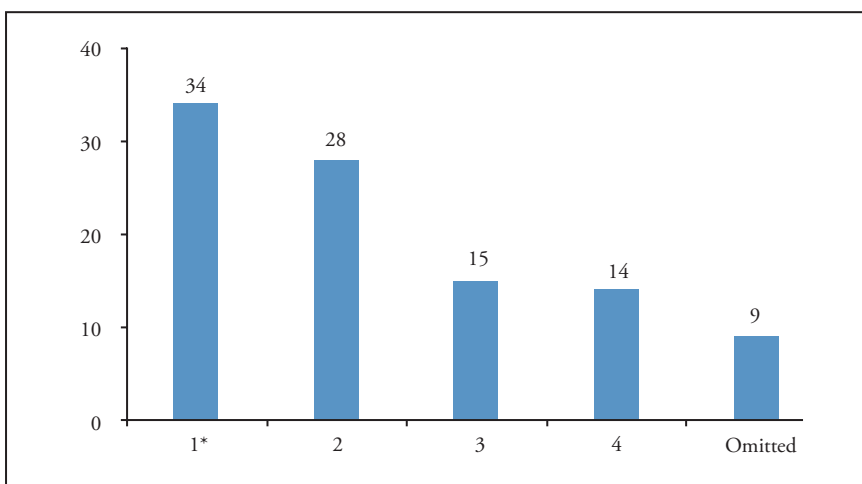
5.3.3 Geometry
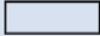
Sample item: Identify desired shape	**Scale score:** 208 (easy)

Item 42. Which of the following figures is a rectangle?
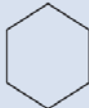
1. (a)   2. (b)   3.(c)   4. (d)

This item requires students to identify the rectangle from amongst given shapes. The scale value of the item is 208, significantly below average difficulty of all items used in the survey. A total of 68% students have identified the correct answer as (2). The figure depicts distribution of remaining 32% responses.
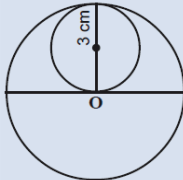
Figure 5.7 (Item 42): Percentage of students in each response category
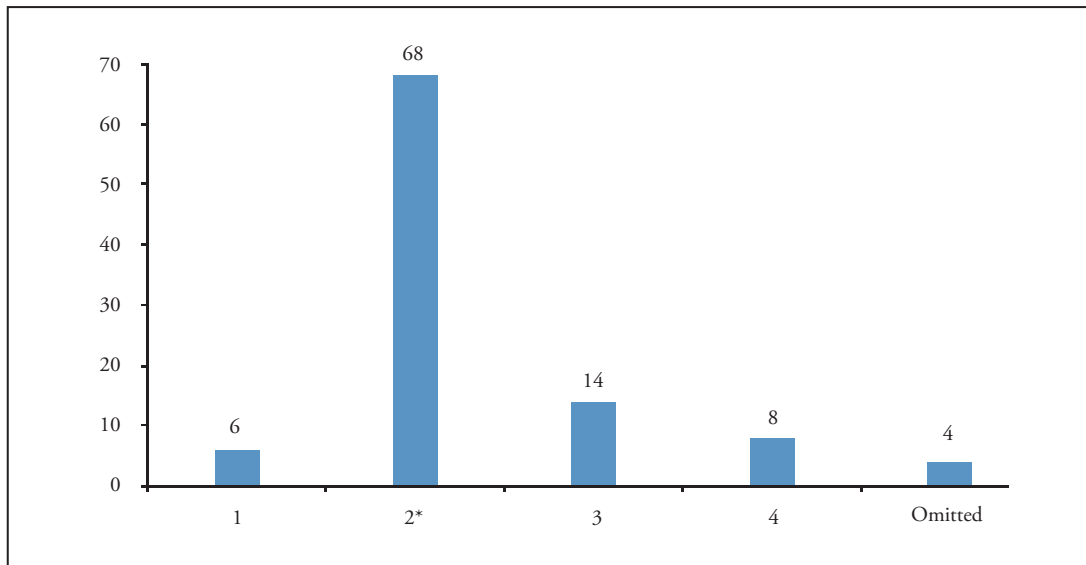
Sample item: Find the radius	**Scale score:** 267 (intermediate)

Item 38. In the figure given here, the radius of the smaller circle is 3 cm. What is the radius of the larger circle having centre 0?

1. 3 cm
2. 6 cm
3. 9 cm
4. 12 cm

This item requires student to find the radius of a circle from information given in the diagram. The scale score of the item is 267, i.e., close to average level of difficulty of item in the survey. About 43% of students chose the correct answer (2). Note that 24% chose incorrect option (1) which suggests that they read the diameter of the smaller circle to be 3 cm. The figure shows how the remaining 33% responded.

Figure 5.8 (Item 38): Percentage of students in each response category

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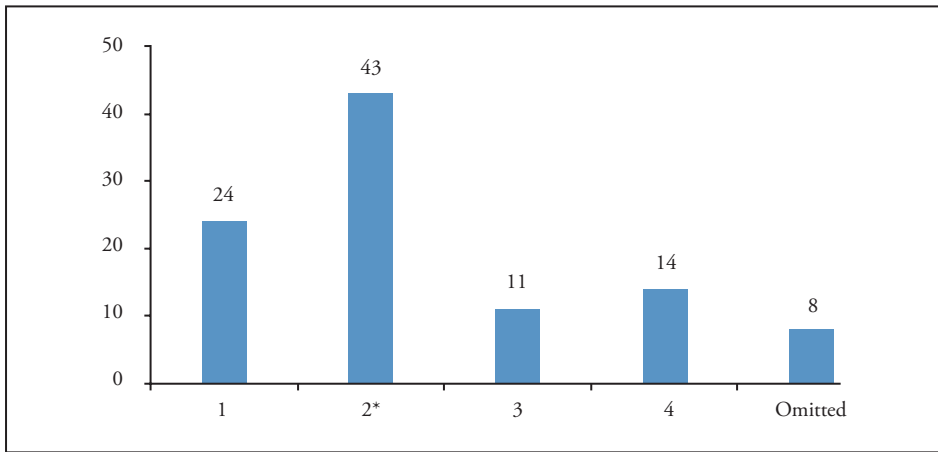
Sample item: Calculate the perimeter	**Scale score:** 321 (hard)

Item 80. In the figure given here, there are four equal squares, each of perimeter 24 cm, joined together. What is the perimeter of the shaded part of the figure?
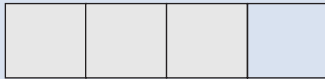
1.   36 cm
2.   42 cm
3.   48 cm
4.   60 cm

This item requires students to calculate perimeter of a rectangle formed by a number of squares of known perimeter. The scale score of the item is 321, i.e., above average level of difficulty of item used in the survey. About 36% chose the correct option (3) and 24% chose incorrect option (4) in this item. This suggests that they included the two internal edges that do not constitute part of the perimeter. The figure shows the response pattern of remaining 40% students.

Figure 5.9 (Item 80): Percentage of students in each response category
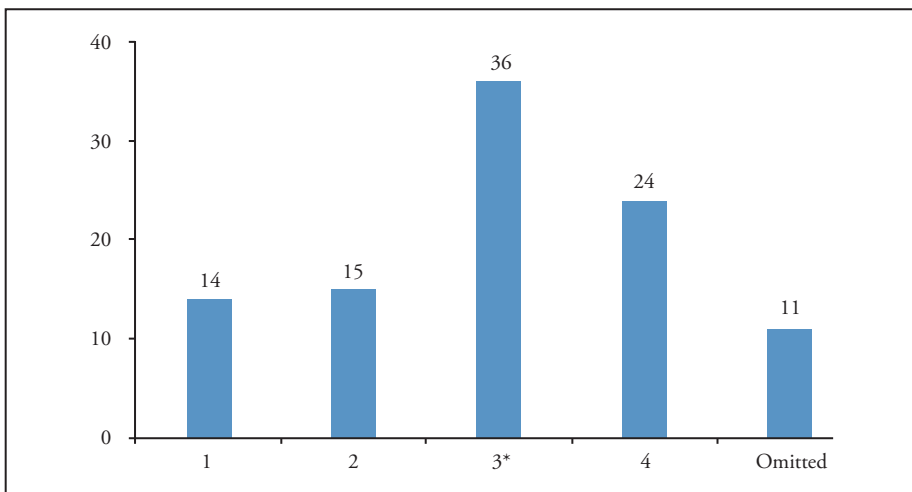
Table 5.2 shows the proportion of students responding correctly to the sample items given above.

Table 5.2: The proportion of students selecting the correct option in each of the nine sample items given above by state/UT

State/ UT	Number system			Calculations			Geometry		
	Item 71	Item 3	Item 49	Item 44	Item 45	Item 28	Item 42	Item 38	Item 80
A & N Islands	50	32	28	72	27	29	60	30	32
Andhra Pradesh	60	38	41	73	46	28	57	34	37
Assam*	48	42	36	67	39	29	54	36	29
Bihar	55	38	34	67	51	30	60	34	32
Chandigarh	49	26	25	83	31	28	68	28	29
Chhattisgarh	51	28	38	62	41	34	61	31	27
Daman & Diu*	68	51	42	83	45	48	82	49	39
Delhi	59	51	42	78	48	32	77	44	27
Goa*	--	40	29	84	34	25	58	41	--
Gujarat	65	51	42	79	46	35	80	52	38
Haryana	57	36	38	75	42	32	53	36	37
Himachal Pradesh	54	38	33	77	43	33	60	38	35
Jammu & Kashmir	64	52	38	71	50	37	65	46	35
Jharkhand**	56	44	35	71	50	34	69	35	30
Karnataka	76	51	46	79	47	42	82	59	40
Kerala*	60	64	41	81	51	22	89	60	32
Madhya Pradesh	71	61	41	76	58	35	72	42	36
Maharashtra*	67	61	50	83	48	33	83	48	38
Meghalaya**	66	32	34	77	44	29	42	38	36
Mizoram**	51	26	34	83	45	24	37	38	31
Nagaland**	54	50	35	75	39	35	55	45	40
Orissa	64	55	41	78	43	26	72	43	33
Puducherry	48	28	22	64	19	27	62	34	30
Punjab	68	40	37	84	41	38	63	47	37
Rajasthan	59	49	38	71	46	32	68	44	31
Sikkim**	77	19	30	78	30	24	41	42	40
Tamil Nadu	75	66	64	78	51	57	86	66	55
Tripura	64	47	44	79	48	41	75	49	30
Uttar Pradesh	75	74	57	82	68	52	84	60	44
Uttarakhand	59	42	31	67	43	28	68	28	30
West Bengal**	59	41	47	88	59	40	80	45	42
All sample	**61**	**45**	**40**	**76**	**45**	**34**	**68**	**43**	**36**

1. States/UTs marked * achieved samples representing <80% of the target population.

2. States/UTs marked ** tested students in Class VI.

3. Due to translation effects, items 31 and 40 were deleted in Goa.

5.4 What can students do in Mathematics?

5.4.1 Computations (Operations)

In this chapter it has already been mentioned what the students performing at different levels of content domain on Mathematics items can do. Table 5.3 shows the performance of students of class V on various cognitive processes or skills on Basic Operations.

Table 5.3: Performance of class V students on Computations (Operations)								
Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No.	Scale Value	% Correct	Item No.	Scale Value	% Correct	Item No.	Scale Value	% Correct
1	241	53	3	262	44	28	304	34
41	216	63	43	242	53			
61	224	61	63	290	34			
31	211	66	33	254	48			
51	210	67	53	307	35			
71	223	61	73	233	57			
11	247	51	17	245	51			
			18	205	69			
			19	224	62			

Knowing (Skill 1)

■ About two-thirds of the students can identify the smallest four digit number (Item 51) and can also write the four-digit numeral in words (Item 31).

Applying (Skill 2)

■ About half of the students can use the knowledge of basic operations in solving the items such as to find out the place value of a number in a six-digit number (Item 19).

■ Nearly one-third students can solve the question based on fractions such as identification of equivalent fractions (Item 53) and differentiate between equivalent and non-equivalent fractions (Item 63).

Reasoning (Skill 3)

■ Only one-third of the students can compute the difference between two decimal numbers (Item 28).

5.4.2 Geometry

Table 5.4 shows the performance of class V students in Geometry in terms of percent.

Table 5.4: Performance of class V students in Geometry								
Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No.	Scale Value	% Correct	Item No.	Scale Value	% Correct	Item No.	Scale Value	% Correct
2	252	49	8	179	79			
42	208	67	48	257	47			
62	323	26	68	318	30			
32	285	38	38	267	43			
52	235	56	58	250	49	–		
72	223	62	78	298	34			
14	168	84	26	261	44			
15	237	54	27	260	45			
16	265	44	–	–	–			

Knowing (Skill 1)

- Above 80% students can identify the figure of a triangle (Item 14).

- About three-fourths of the students cannot identify the largest angle among the given angles in a geometrical figure (Item 62).

Applying (Skill 2)

- About 79% students can count the sides of a given figure (Item 8).

- About 70% students cannot identify the number of triangles embedded in a large triangular figure (Item 68).

- More than 65% students cannot compute area from the given side in a square (Item 78).

5.4.3 Measurement

Table 5.5 shows the performance of class V students in Measurement in terms of percent.

Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No.	Scale Value	% Correct	Item No.	Scale Value	% Correct	Item No.	Scale Value	% Correct
13	224	59	6	248	50	10	278	38
			46	214	67	50	422	22
			66	232	57	70	229	58
			7	249	50	40	271	41
			47	266	44	60	289	35
			67	266	44	80	321	35
			37	227	60	30	283	37
			57	260	45			
			77	239	55			
			23	246	51			
			24	274	40			
			25	268	43			

Table 5.5: Performance of class V students in Measurement

Knowing (Skill 1)

- About 59% students can do simple measurement problems (Item 13).

Applying (Skill 2)

- Nearly half of the students can apply the knowledge of measurement in solving problems like computation of area of a rectangle of given dimensions (Item 7).

- About two-thirds of the students can read the time given in a clock (Item 37).

- About 60% students cannot match equivalence of measurement scales/units (Item 24).

- More than half of the students cannot compute the perimeter of a given square (Item 67).

Reasoning (Skill 3)

- Only 22% students can do word problem based on money spent on different heads (Item 50).

5.4.4 Number System

Table 5.6 shows the performance of class V students on the Number System in terms of percent.

Table 5.6: Performance of class V students on the Number System								
Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No.	Scale Value	% Correct	Item No.	Scale Value	% Correct	Item No.	Scale Value	% Correct
12	239	54	4	252	48	9	292	34
			44	184	76	49	280	39
			64	228	58	69	229	58
			5	258	46	39	277	38
			45	261	45	59	275	40
			65	278	39	79	271	41
			34	261	44	29	227	61
			54	240	54			
			74	261	44			
			35	254	47			
			55	276	39			
			75	325	26			
			36	244	52			
			56	271	42			
			76	257	48			
			20	237	55			
			21	192	72			
			22	258	46			

Knowing (Skill 1)

■ About 54% students can do simple problems of number system (Item 12).

Applying (Skill 2)

■ More than two-thirds of the students can add two four-digit numbers (Item 44) and can also add two-digit numbers with carry (Item 21).

■ About three-fourths of the students cannot compute sum of the fractional number with different denominator (Item 75).

Reasoning (Skill 3)

■ About 60% students can find multiplier of a given number (Item 29).

Chapter 6

Student Achievement in Environmental Studies

CHAPTER 6 STUDENT ACHIEVEMENT IN ENVIRONMENTAL STUDIES

This chapter summarises the achievement of students in EVS in the NAS. Overall achievement for each of the participating states and UTs is reported. In addition, information about differences in achievement by student gender, school location and social category is provided. In the majority of states, students nearing the end of class V were tested. However, in a minority of states, the arrangement of the school year meant that students had to be tested at the beginning of class VI. Results for these groups are presented separately to reduce the chance of readers inadvertently comparing different cohorts.

For each state, a sample was drawn which was designed to be representative of the entire target population. In most states, the sample coverage achieved was regarded as satisfactory as it covered more than 80% of the target population. However, in some states, local logistical challenges and resource constraints meant that this criterion was not met and so the sample coverage, although significant, was deemed inadequate. To ensure that readers are aware of this when comparing achievement levels, results for states with inadequate sample coverage are reported separately.

6.1 How did the states and UTs perform in Environmental Studies?

Tables 6.1, 6.2 and 6.3 show the distribution of student achievement for the 31 participating states and UTs. Each table represents one of the three categories: those where class V students were tested and where sample coverage was adequate; those where class V students were tested but where sample coverage was inadequate; and those where class VI students were tested. Within each group, states are listed in alphabetical order.

The tables list each state's average score on a scale from 0 to 500. For each score, the 'standard error' is given to indicate the degree of imprecision arising from the sampling process. Finally, the tables indicate whether a state's average score is significantly different from the group's average or not.

Table 6.1: Average EVS scores for states and UTs where class V students were tested and the population coverage was >80%			
States and UTs	**Average Score**	**Standard Error**	**Significant Difference**
A & N Islands	233	3.1	⊍
Andhra Pradesh	238	2.0	⊍
Bihar	236	3.1	⊍
Chandigarh	226	2.1	⊍
Chhattisgarh	234	3.7	⊍
Delhi	262	3.2	⊓
Gujarat	250	2.9	●
Haryana	232	2.2	⊍
Himachal Pradesh	243	2.9	⊍
Jammu & Kashmir	258	2.9	⊓
Karnataka	275	2.7	⊓
Madhya Pradesh	264	3.3	⊓
Orissa	253	3.0	●
Puducherry	222	3.1	⊍

Punjab	245	2.9	●
Rajasthan	246	3.1	●
Tamil Nadu	288	2.7	�
Tripura	257	3.3	�
Uttar Pradesh	284	3.6	�
Uttarakhand	237	3.0	☟
Group Average	**249**	**0.7**	

● The state's average score is not significantly different from that of the group.
� The state's average score is significantly above that of the group.
☟ The state's average score is significantly below that of the group.

The 20 states and UTs represented in Table 6.1 are those in which class V students were tested and where the sample covered at least 80% of the target population. The average score for this group was 249 (with a standard error of 0.7). The results reveal substantial differences in EVS achievement between the highest performing state (288 for Tamil Nadu) and the lowest performing state (222 for Puducherry). In EVS, seven states had average scores significantly above that of the group; nine states had average scores significantly below that of the group; and four states had average scores that were not significantly different from that of the group.

Table 6.2: Average EVS scores for states and UT where class V students were tested and the population coverage was <80%			
States and UT	**Average Score**	**Standard Error**	**Significant Difference**
Assam	239	2.1	☟
Daman & Diu	255	6.8	●
Goa	235	3.2	☟
Kerala	252	1.6	●
Maharashtra	263	2.3	�
Group Average	**250**	**1.7**	

● The state's average score is not significantly different from that of the group.
� The state's average score is significantly above that of the group.
☟ The state's average score is significantly below that of the group.

The five states and UT represented in Table 6.2 are those in which class V students were tested but where the sample covered less than 80% of the target population. For this group, great care should be taken when considering an average score as it may not be a reliable measure for the whole state/UT.

Table 6.3: Average EVS scores for states where class VI students were tested			
States	**Average Score**	**Standard Error**	**Significant Difference**
Jharkhand	245	3.6	☟
Meghalaya	256	2.7	●
Mizoram	255	1.0	●
Nagaland	255	3.7	●
Sikkim	245	1.8	☟
West Bengal	266	2.4	�
Group Average	**254**	**1.1**	

● The state's average score is not significantly different from that of the group.
� The state's average score is significantly above that of the group.
☟ The state's average score is significantly below that of the group.

The six states represented in Table 6.3 are those in which class VI students were tested. For this group, the average EVS score was 254 (standard error 1.1). West Bengal performed significantly better than the group average whereas the average scores of Sikkim and Jharkhand were significantly below the group average.

The tables and figures that follow illustrate the range of achievement within states and across groups of states. The tables list the scores achieved by students at key *percentiles*. For example, the score at the 25th percentile is the score which 75% of students achieve or surpass; the score at the 90th percentile is the score that 10% of students achieve or surpass.

The range between the 25th and 75th percentiles (the inter-quartile range) represents the performance of the middle 50% of students. Hence, this is a good indicator of the state's degree of homogeneity in terms of the EVS achievement of its students.

Table 6.4: Percentile scores in EVS for states and UTs where class V students were tested and the population coverage was >80%							
States and UTs	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Range 75−25	Range 90−10
A & N Islands	182	204	227	260	290	56	108
Andhra Pradesh	184	215	228	269	292	54	108
Bihar	177	194	227	274	315	80	138
Chandigarh	183	203	226	241	272	38	89
Chhattisgarh	170	190	227	271	318	81	149
Delhi	201	227	263	292	332	66	131
Gujarat	186	222	240	280	319	58	133
Haryana	180	203	227	259	290	56	110
Himachal Pradesh	184	216	231	272	309	56	125
Jammu & Kashmir	182	222	265	300	331	78	148
Karnataka	212	232	275	316	341	84	129
Madhya Pradesh	186	225	271	308	335	83	149
Orissa	181	222	250	292	324	69	143
Puducherry	179	192	223	235	271	43	92
Punjab	186	219	232	273	314	54	128
Rajasthan	181	212	236	280	320	68	139
Tamil Nadu	225	250	283	327	356	77	132
Tripura	186	224	263	295	326	70	140
Uttar Pradesh	218	239	281	328	355	89	137
Uttarakhand	179	207	229	271	300	63	121
Group Distribution	**188**	**216**	**245**	**282**	**316**	**66**	**128**

Note: Ranges may not agree due to rounding.

Figure 6.1: Percentile scores in EVS for states and UTs where class V students were tested and the population coverage was >80%

The inter-quartile range (i.e., the range between the 75th and 25th percentiles) is highly variable. For example, Chandigarh has an inter-quartile range of just 38 whilst Uttar Pradesh has a corresponding value of 89. These values suggest that the class V population in Chandigarh is far more homogeneous than that of Uttar Pradesh. In most states, the range of performance for the middle group was between 50 and 80 scale score points. Performance at the 10th and 90th percentiles respectively shows extremes in low and high achievement. The range between these two points, which includes 90 percent of the population, is highly variable ranging from 89 (Chandigarh) to 149 (Chhattisgarh and Madhya Pradesh).

The percentiles provide additional information when comparing EVS performance amongst states. For example, when the states are arranged in order of average score, the differences between adjacent states tend to be small. However, the range of scores may not be similar. For example, there is no significant difference between the average score of Bihar (236) and Andhra Pradesh (238). However, the score ranges between the 25th and 75th percentiles are very different: Bihar's range is 80 compared with Andhra Pradesh's range of 54. This indicates that whilst average achievement is very similar in the two areas, Bihar has a more heterogeneous group of class V students than Andhra Pradesh.

Table 6.5: Percentile scores in EVS for states and UT where class V students were tested and the population coverage was <80%

States and UT	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Range 75−25	Range 90−10
Assam	182	211	230	272	296	60	114
Daman & Diu	194	224	250	283	326	59	132
Goa	188	214	228	261	284	47	96
Kerala	207	227	257	275	296	48	90
Maharashtra	199	227	265	299	334	72	135

Figure 6.2: Percentile scores in EVS for states where class V students were tested and the population coverage was <80%
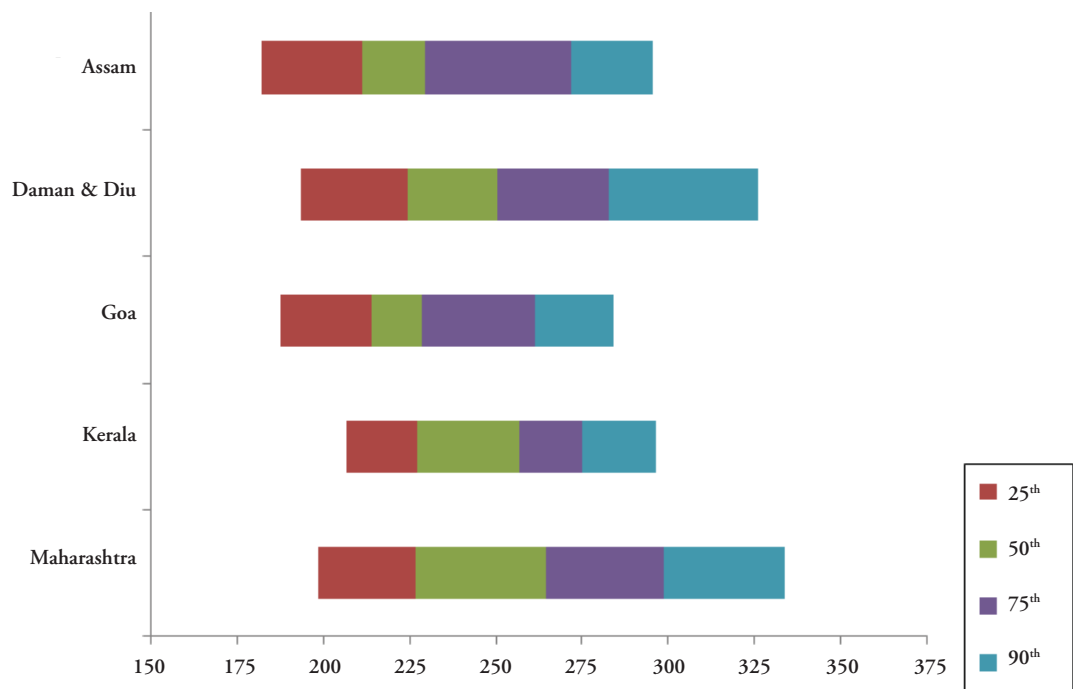
Table 6.6: Percentile scores in EVS for states where class VI students were tested

States and UT	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Range 75−25	Range 90−10
Jharkhand	178	202	231	281	328	79	150
Meghalaya	199	225	250	281	322	56	123
Mizoram	220	230	263	275	289	46	69
Nagaland	185	220	242	296	332	76	147
Sikkim	209	226	237	271	282	44	73
Group Distribution	**201**	**222**	**249**	**283**	**313**	**61**	**112**

Figure 6.3: Percentile scores in EVS for states where class VI students were tested
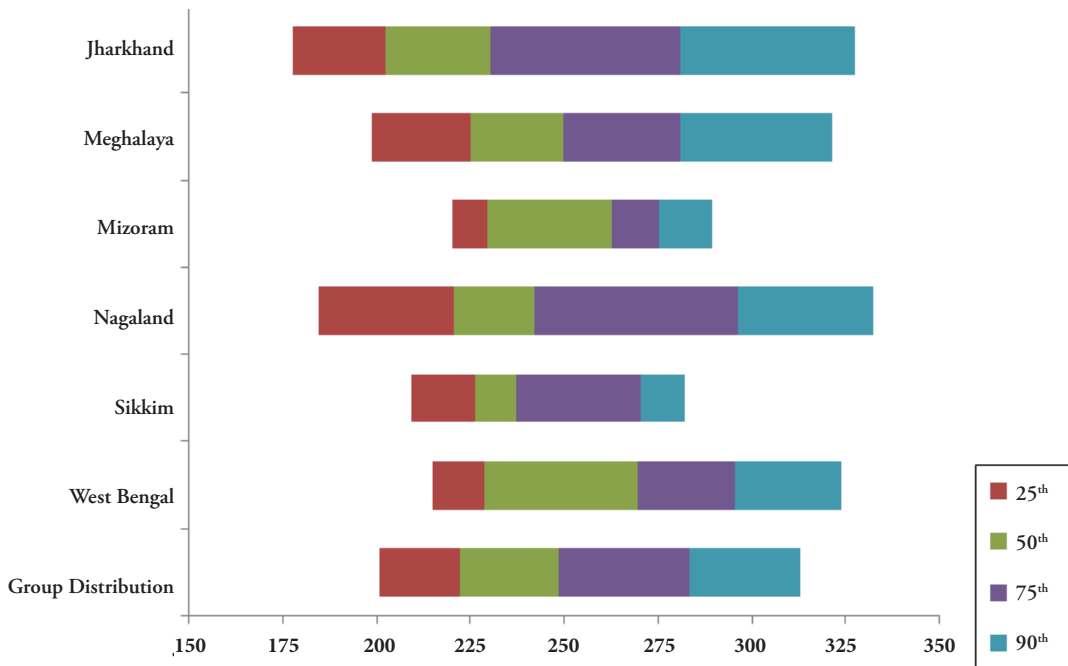
The inter-quartile range for the states where class VI students were tested varied considerably from about 44 scale points in Sikkim and Mizoram to more than 75 points in Nagaland and Jharkhand. The range of scale points covering the population from the 10th to the 90th percentile varied dramatically from the diverse state of Jharkhand (150) to Mizoram (69) where relatively little difference between high and low performing student was detected.

Performance between 10th and 90th percentile, which includes 90 percent of the population, was between 69 for Mizoram and 150 points for Jharkhand. It can be seen that even though West Bengal has the highest median performance (270), Nagaland has a higher score at the 90th percentile, suggesting that its high achieving students do extremely well.

6.2 How did various groups perform in Environmental Studies?

The tables below compare the average performances of different groups. Performance is compared by gender, by school location, and by social category. (The quoted scores were calculated for the 20 states and UTs where students were tested in class V and coverage of the population was at least 80% since this group gives the most reliable picture.)

6.2.1 Are there any gender-related differences in EVS achievement?

Table 6.7 compares the average EVS scores achieved by boys and girls. It shows that, within this group of states, no significant difference was detected in the average achievement levels of the two groups.

Table 6.7: Average EVS scores for groups by gender (class V)

Boys' Average(SE)	Girls' Average(SE)	Significant Difference
249 (0.7)	250 (0.8)	●

● No significant difference between the average performance of girls and boys.

Tables 6.8, 6.9 and 6.10 below show that, in general, the general result, i.e., no significant difference between the average achievement of boys and girls holds for all states and UTs.

Table 6.8: Average EVS scores, by gender, for states and UTs where class V students were tested and population coverage was >80%

States and UTs	Boys' Average (SE)	Girls' Average (SE)	Significant Difference
A & N Islands	230 (2.6)	236 (3.8)	●
Andhra Pradesh	240 (2.3)	236 (2.2)	●
Bihar	236 (3.2)	236 (3.7)	●
Chandigarh	227 (2.3)	225 (2.3)	●
Chhattisgarh	234 (3.7)	233 (4.5)	●
Delhi	263 (4.3)	263 (4.8)	●
Gujarat	250 (3.2)	250 (3.5)	●
Haryana	233 (2.5)	231 (2.4)	●
Himachal Pradesh	242 (2.9)	244 (3.2)	●
Jammu & Kashmir	259 (2.9)	258 (3.4)	●
Karnataka	274 (2.9)	277 (3.1)	●
Madhya Pradesh	263 (3.6)	265 (4.0)	●
Orissa	252 (3.2)	254 (3.3)	●
Puducherry	218 (2.0)	225 (4.9)	●
Punjab	246 (3.1)	245 (3.0)	●
Rajasthan	246 (3.0)	250 (4.0)	●
Tamil Nadu	288 (2.7)	287 (3.0)	●
Tripura	253 (3.9)	261 (3.5)	●
Uttar Pradesh	283 (3.8)	284 (3.8)	●
Uttarakhand	238 (3.0)	237 (3.2)	●
Group Average	**249 (0.7)**	**250 (0.8)**	●

● No significant difference between the average performance of girls and boys.

Table 6.9: Average EVS scores, by gender, for states and UT where class V students were tested and population coverage was <80%

States and UTs	Boys' Average (SE)	Girls' Average (SE)	Significant Difference
Assam	238 (2.1)	240 (2.6)	●
Daman & Diu	250 (6.2)	262 (7.1)	●
Goa	233 (5.0)	237 (4.0)	●
Kerala	252 (2.0)	252 (1.7)	●
Maharashtra	264 (2.6)	262 (2.5)	●

● No significant difference between the average performance of girls and boys.

Table 6.10: Average EVS scores, by gender, for states where class V students were tested			
States	**Boys' Average (SE)**	**Girls' Average (SE)**	**Significant Difference (girls > boys)**
Jharkhand	247 (4.0)	242 (3.8)	●
Meghalaya	254 (2.9)	257 (3.0)	●
Mizoram	256 (1.3)	254 (1.3)	●
Nagaland	259 (4.1)	255 (4.0)	●
Sikkim	248 (2.0)	242 (2.0)	●
West Bengal	264 (2.9)	267 (3.3)	●
Group Average	**255 (1.2)**	**253 (1.3)**	●

● No significant difference between the average performance of girls and boys.

6.2.2 Are there any differences in EVS achievement related to school location?

Table 6.11 compares the average EVS scores achieved by students in rural and urban schools. It shows that within this group of states, no significant difference was detected in the average achievement levels of the two groups.

Table 6.11: Average EVS scores for groups by location (class V)			
	Rural Average (SE)	**Urban Average (SE)**	**Significant Difference**
Group (by school location)	250 (0.8)	247 (1.7)	●

● No significant difference was observed in the average achievement of urban and rural schools.

Tables 6.12, 6.13 and 6.14 below show that, in general, the general result, i.e., no significant difference between rural and urban students holds for all states and UTs. However, four exceptional cases were detected: in A & N Islands, Daman and Diu and Nagaland, the rural students outperformed the urban students whereas in Goa, the urban students outperformed the rural students by a margin which is statistically significant.

Table 6.12: Average EVS scores, by location, for states and UTs where class V students were tested and population coverage was >80%			
States and UTs	**Rural Average (SE)**	**Urban Average (SE)**	**Significant Difference (Urban/ Rural)**
A & N Islands	239 (3.9)	224 (4.7)	☋
Andhra Pradesh	239 (2.3)	234 (4.3)	●
Bihar	237 (3.5)	227 (5.5)	●
Chandigarh	226 (2.8)	226 (2.8)	●
Chhattisgarh	235 (4.3)	227 (8.8)	●
Delhi	259 (5.6)	262 (3.7)	●
Gujarat	251 (3.0)	241 (9.7)	●
Haryana	232 (2.4)	233 (5.4)	●
Himachal Pradesh	243 (3.2)	242 (5.1)	●
Jammu & Kashmir	259 (3.0)	248 (15.0)	●
Karnataka	278 (3.3)	270 (5.4)	●
Madhya Pradesh	261 (3.5)	279 (9.7)	●

Orissa	252 (3.3)	259 (9.2)	●
Puducherry	218 (2.1)	230 (7.9)	●
Punjab	247 (3.3)	237 (4.3)	●
Rajasthan	248 (3.3)	246 (8.6)	●
Tamil Nadu	290 (3.3)	282 (5.1)	●
Tripura	256 (3.6)	259 (10.0)	●
Uttar Pradesh	284 (4.0)	278 (9.4)	●
Uttarakhand	237 (3.0)	239 (7.4)	●
Group Average	**250 (0.8)**	**247 (1.7)**	●

● No significant difference between the average performance in rural and urban students.

☊ Rural students' average performance is significantly greater than that of urban students.

Table 6.13: Average EVS scores, by location, for states and UT where class V students were tested and population coverage was <80%			
States and UT	**Rural Average (SE)**	**Urban Average (SE)**	**Significant Difference (Urban/ Rural)**
Assam	238 (2.2)	250 (7.3)	●
Daman & Diu	262 (8.3)	231 (8.1)	☊
Goa	228 (3.0)	244 (6.3)	☋
Kerala	252 (1.8)	252 (4.0)	●
Maharashtra	265 (3.1)	259 (4.5)	●
Group Average	**249 (1.9)**	**247 (2.8)**	●

● No significant difference between the average performance of girls and boys.

☊ Rural students' average performance is significantly greater than that of urban students.

☋ Rural students' average performance is significantly lower than that of the urban students.

Table 6.14: Average EVS scores, by location, for states where class VI students were tested			
States	**Rural Average (SE)**	**Urban Average (SE)**	**Significant Difference (Urban/Rural)**
Jharkhand	245 (4.1)	244 (9.2)	●
Meghalaya	257 (3.4)	252 (4.0)	●
Mizoram	255 (1.5)	256 (1.6)	●
Nagaland	259 (4.3)	242 (7.1)	☊
Sikkim	244 (2.1)	250 (4.8)	●
West Bengal	265 (2.8)	266 (4.6)	●
Group Average	254 (1.3)	252 (2.4)	●

● No significant difference between the average performance of girls and boys.

☊ Rural students' average performance is significantly greater than that of urban students.

6.2.3 Are there any differences in EVS achievement related to caste category?

Table 6.15 compares the average EVS scores achieved by students in different social categories. It shows that within this group of states, no significant difference was detected in the average achievement levels of students in the SC and ST categories. Students classified as being in the OBC category significantly outperformed those in the ST category. On an average, students in the General category achieved significantly higher scores than those in other categories.

Category	Average (SE)	SC	ST	OBC	General
SC	245 (1.1)	–	●	◔	◔
ST	245 (1.8)	●	–	◔	◔
OBC	250 (1.1)	◖	◖	–	◔
General	254 (1.2)	◖	◖	◖	–

Table 6.15: Average EVS scores for groups by social category (class V)

● The average scores of the two categories being compared are not significantly different.

◖ The average scores of the category given in the first column is significantly higher than that of the category with which it is being compared.

◔ The average score of the category given in the first column is significantly lower than that of the category with which it is being compared.

6.3 Conclusion

The average achievement of students in EVS varies greatly across the states and UTs of India. There is a highly significant difference between outcomes in high scoring states such as Tamil Nadu (288), Uttar Pradesh (284) and Karnataka (275) and low scoring states/UTs such as Puducherry (222), Chandigarh (226) and Haryana (232).

States also vary greatly in the range between their lowest and highest achieving students as revealed by their inter-quartile score ranges. Some states/UTs, e.g., Chandigarh (38), Puducherry (43) and Sikkim (44) have relatively homogeneous cohorts whilst others have far more diverse outcomes, e.g., Uttar Pradesh (89), Karnataka (84) and Madhya Pradesh (83).

Overall, no significant differences were detected in the average achievement of girls and boys. Similarly, no significant difference was detected between the achievement level of rural and urban students.

The survey did find that students from the General Category outperformed their peers in the SC, ST and OBC categories by a statistically significant margin.

The following chapter provides more information about what class V students at various levels of achievement know and can do in the domain of Environmental Studies.

Chapter 7

Environmental Studies: What Students Know and Can Do

CHAPTER 7 ENVIRONMENTAL STUDIES: WHAT STUDENTS KNOW AND CAN DO

7.1 Overview of the Environmental Studies Tests

The EVS tests given to class V students consisted of three test booklets, each containing 40 multiple choice items. The items were chosen keeping in view the whole range of the content. Out of 40 items, 20 items were common across all test forms. These served as 'anchors' so that the different test booklets could be linked together and hence, all items could be placed on a common scale (See below). In addition, each test form contained an extra, 20 unique items. Thus, altogether the EVS tests used in the survey comprised 80 items.

The items were designed to test a range of relevant *cognitive processes* or 'skills'. These are classified as knowing, applying and reasoning as defined below:

> **Cognitive Processes for Environmental Studies**
>
> **Knowing (Skill 1):** In items testing this process, students are expected to recall or recognise terms, facts, symbols, units, and basic scientific/social concepts. They select appropriate apparatus and measurement devices for conducting experiments/investigations.
>
> **Applying (Skill 2):** The items in this cognitive domain are designed to involve the application of knowledge and understanding in straightforward situations. The items testing 'applying' require students to compare, contrast and classify, and to interpret information in light of a concept. Students are also expected to use and apply their understanding of concepts and principles in the known situations. Simple, i.e., single step problems requiring a numerical solution are also included.
>
> **Reasoning (Skill 3):** In items testing 'reasoning', students need to demonstrate their ability to solve problems, draw conclusions and make decisions. For this, students are required to analyse a problem (perhaps in new situation), identify relationships, determine underlying principles, devise and explain strategies for problem solving.

7.2 Item Mapping

Following testing, the responses of students to the various tasks were analysed using Item Response Theory (Appendix II). The three test forms were then aligned using the anchor items, thereby placing all items on a single scale comprising scores from 0 to 500. On this scale, the mean score was set at 250 with a standard deviation of 50. Calibrating the items according to their levels of difficulty places them on an 'item map' with the more demanding items at the top and the easiest items at the bottom. Such item maps give us a picture as to what students at different levels of ability know and can do.

The item map for EVS is given below. The scale score in the first column shows the level of difficulty for each item. Perhaps more importantly, this score also represents the minimum score on the ability scale necessary for a student to have an even chance of success on the item. The map also includes a brief description of what students needed to do to answer the item correctly, i.e., each item is classified according to the *cognitive process* being evaluated.

	Table 7.1: Item map in EVS	
Scale Score	**Mental Processes**	**Question Description**
351	Applying	Understand the phenomena of lunar eclipse
338	Knowing	Know the importance of forest in human life
333	Reasoning	Establish relationship between measuring apparatus and quantity of water
302	Applying	Find the effect of exhaled air on mirror
300		(no item appeared at this difficulty level)
296	Knowing	Know the sources of energy and their by products
290	Knowing	Know the components of food/diet and their functions
284	Applying	Understand the process of breathing
277	Applying	Find out the least polluting fuel on the basis of their combustion
275		(no item appeared at this difficulty level)
272	Applying	Establish relationship between wind strength and flags' position
269	Applying	Reason out the importance of wild animals in ecosystem
264	Applying	Identify the stages of the seed germination
263	Reasoning	Reason out to find the direction in the map
260	Knowing	Know about the neighboring countries of India
256	Knowing	Know the edible part of a carrot
253	Applying	Interpret the graph to find out heartbeats of the mouse
251	Reasoning	Explain the reason behind the construction of dams
250	Reasoning	Analyse the family tree and find solution
249	Applying	Interpret the graph to find out rainfall on Wednesday
246	Reasoning	Find out the trend of growth in a plant
241	Applying	Identify the location of Jim Corbett Park in the map
240	Reasoning	Understand the family tree and interpret the relationship
237	Knowing	Know the animal source of food
234	Reasoning	Establish relationships on the basis of family tree
231	Knowing	Know the sources of water and their usage
228	Reasoning	Relate different types of clothes with their properties
225	Applying	Interpret the graph to identify the animal that has lowest heartbeats
224	Applying	Apply knowledge to find the direction in the map
218	Knowing	Know the suitable conditions for breeding of mosquitoes
215	Reasoning	Find out solution for patient when doctor is not available
213	Applying	Compare the means of transportation causing pollution
211	Applying	Interpret the graph to find out the most rainy day
209	Knowing	Know the national game of India
200		(no item appeared at this difficulty level)
199	Knowing	Know the properties of solutes and solvents
185	Knowing	Know the name of disease spread by mosquitoes
182	Applying	Classify the group of domestic animals
172	Knowing	Recognise birds on the basis of their features

Note: Percent correct values from classical test theory are given in Appendix IV.

The map shows that class V students demonstrate a wide range of ability in the domain of EVS.

Students at the lower end of the scale, i.e., those with scale scores in the range of, say, 170 to 225 can demonstrate all three cognitive processes—provided that the context is clear and the tasks non-complex. For example, they are able to use information from a table to locate the places and direction in the map, to classify animals and plants on

the basis of their specific characteristics, to recall the disease spread by mosquitoes and suitable conditions of their spreading, to identify living organism on the basis of their features, habits and habitats etc.

Students performing in the intermediate range of the scale (say, 225 to 275) can do more. In addition to that described above, they can analyse the issues, interpret information, establish relationships, relate information, and find out solutions in different situations. They can also locate places in the map, reason out the construction of a dam etc. They can also identify cause and effect relationships and make inferences in various situations.

Students performing at higher end of the scale, i.e., those with scale scores above, say, 275 can do more. In addition to that described above, they know and can explain the components of diet and their functions, sources of energy and their by products, and the importance of forest in human life. They can also establish relationships, and explain physical effects, e.g., exhaled air on a mirror, the phenomena of lunar eclipses etc.

7.3 Sample Items

Items reproduced below were used in the tests of EVS. Statistics showing how students responded to these items are given. These items are arranged in increasing order of difficulty. They can also be located on the item map.

Sample item: Knowing	**Scale score:** 172

Item 61. Which of the following birds can NOT fly?
        1.   Parrot
        2.   Crow
        3.   Eagle
        4. Ostrich	

The item requires students to recall the bird that cannot fly. The scale score of this item was 172, i.e., significantly below the average level of difficulty of items in the survey. As many as 81% of students in the sample were able to select the correct answer (4). The figure shows how the remaining 19% responded.

Figure 7.1 (Item 61): Percentage of students in each response category
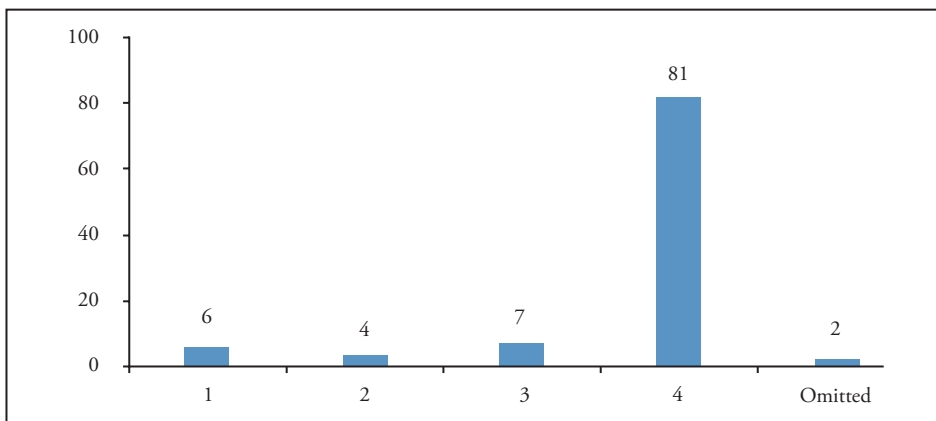
Sample item: Knowing	**Scale score:** 256

Item 33. Which part of the carrot plant is eaten?
        1.   flower
        2.   leaves
        3.   stem
        4. root	

This item requires students to recall the edible part of carrot. The scale score of this item was 256, i.e., very close to the average level of difficulty of items in the survey. Almost 49% of students in the sample were able to select the correct answer (4). The figure shows how the remaining 51% responded.

Figure 7.2 (Item 33): Percentage of students in each response category

Sample item: Knowing	Scale score: 296
Item 44. Which one of the following sources of energy produces carbon dioxide? 1. Solar energy 2. Energy from coal 3. Wind energy 4. Hydrothermal energy	

This item requires students to identify the source of energy which produces carbon dioxide. The scale score of this item was 296, i.e., above the average level of difficulty of items in the survey. Only 36% of students in the sample were able to select the correct answer (2). As many as 62% students chose the wrong options. Out of 62%, 26% students selected option '1' and 24% opted '3'. It means that the options 1 and 3 worked as good distracters. Hence, the item proved to be quite difficult.

Figure 7.3 (Item 44): Percentage of students in each response category
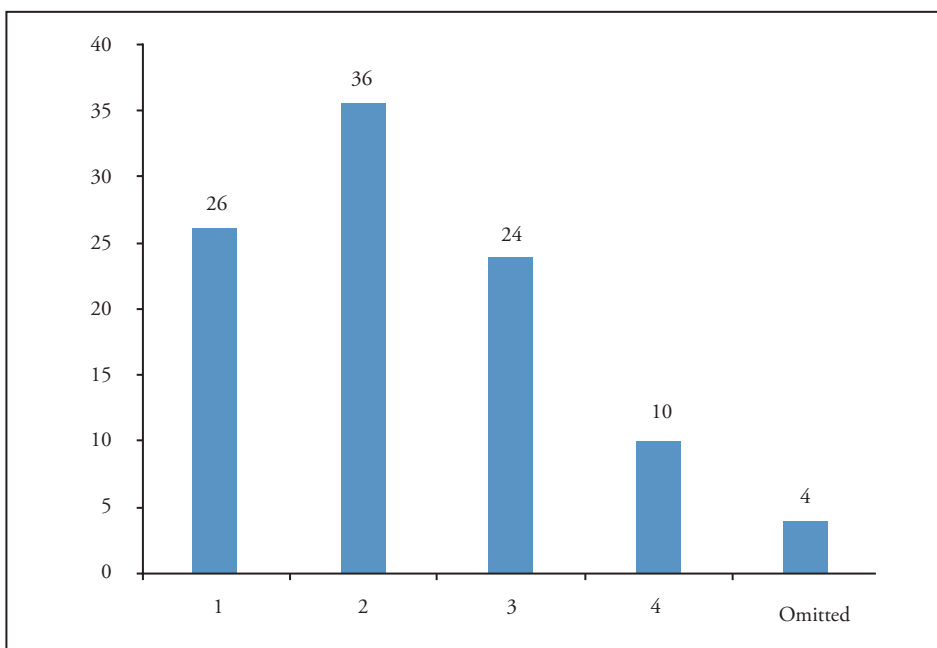
Sample item: Knowing Applying	Scale score: 182
Item 3. Which of the following groups contains only domestic animals? 1. tiger, lion, leopard 2. cow, dog, cat 3. crow, peacock, owl 4. deer, bear, cheetah	

This item requires students to classify the group of domestic animals. The scaled score of this item was 182, i.e., below the average level of difficulty of items in the EVS survey. As many as 79% of students in the sample were able to select the correct answer (2). The figure shows how the remaining 21% responded.

Figure 7.4 (Item 3): Percentage of students in each response category
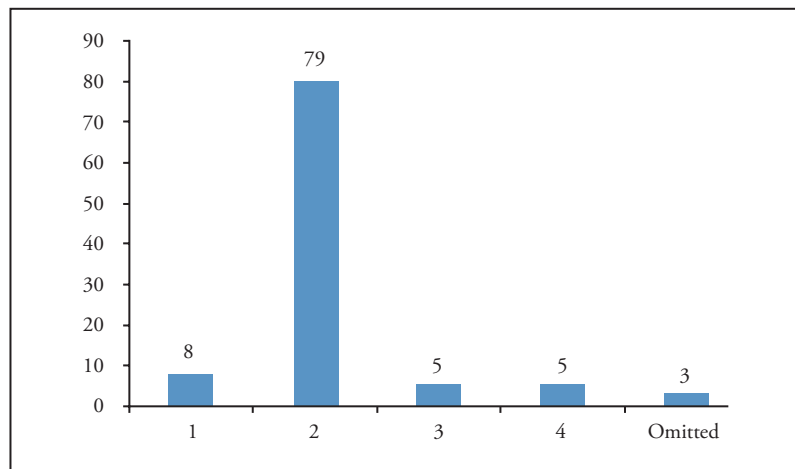
Direction: Renu's classmates measured rainfall for a week. Based on the chart, please answer the following question:
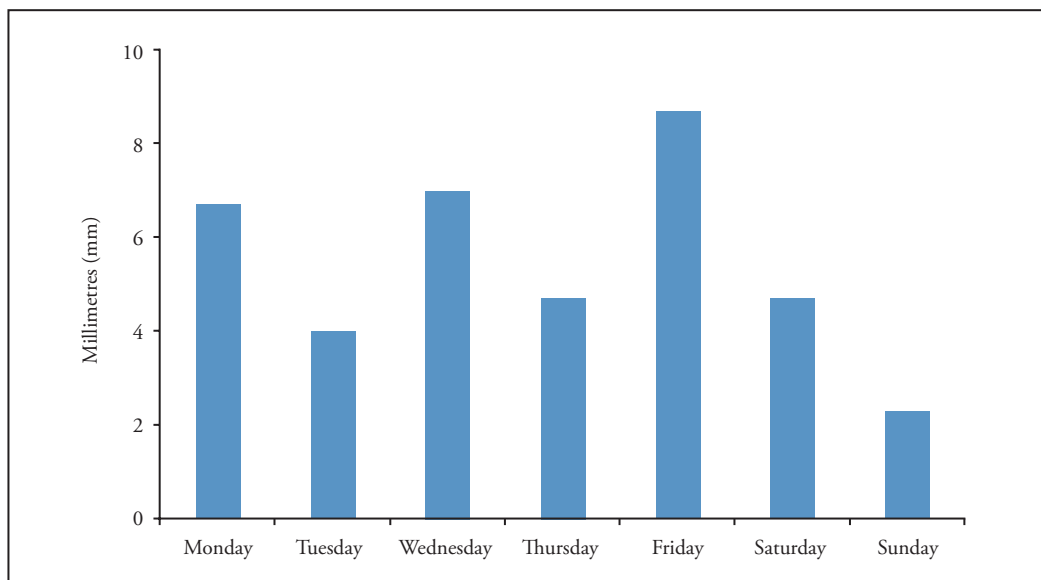
Sample item: Applying	Scale score: 249
Item 9. What was the rainfall on Wednesday? 1. 8 mm 2. 7 mm 3. 5 mm 4. 4 mm	

This item requires students to interpret the given graph and find out the measurement of rainfall on Wednesday. The scale score of this item was 249, i.e., very close to the average level of difficulty of items in the survey. Around 50% of students in the sample were able to select the correct answer (2). The figure shows how the remaining 50% responded.

Figure 7.5 (Item 9): Percentage of students in each response category
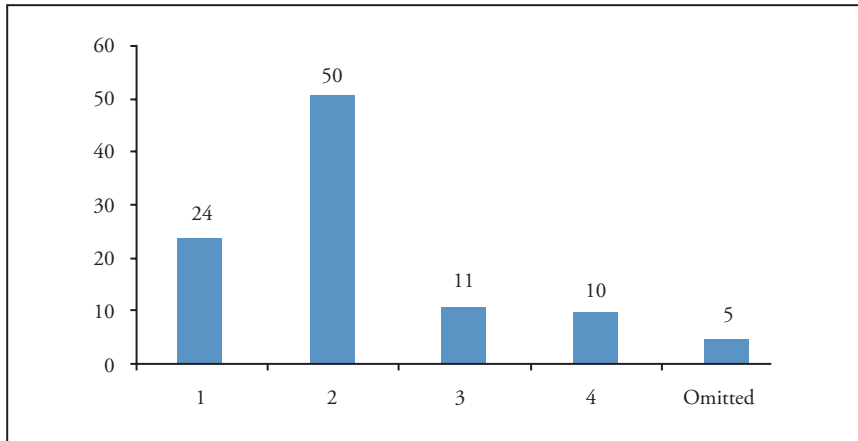
Sample item: Applying	Scale score: 302

Item 49. A part of the mirror clouds up when you breathe on it because of_____ .
1. water vapour from your breath
2. carbon dioxide from your breath
3. oxygen from your breath
4. nitrogen around you

The item requires students to explain the effect of exhaled air on the mirror. The scale score of this item was 302, i.e., significantly above the average level of difficulty of items in the survey. Only 36% of students in the sample were able to select the correct answer (1). The figure shows how the remaining 64% responded. It is clear from the figure that options 2nd and 3rd worked as strong distracters. Perhaps, students thought that carbon dioxide and oxygen were also present in the air. Hence, the item was hard in nature.

Figure 7.6 (Item 49): Percentage of students in each response category
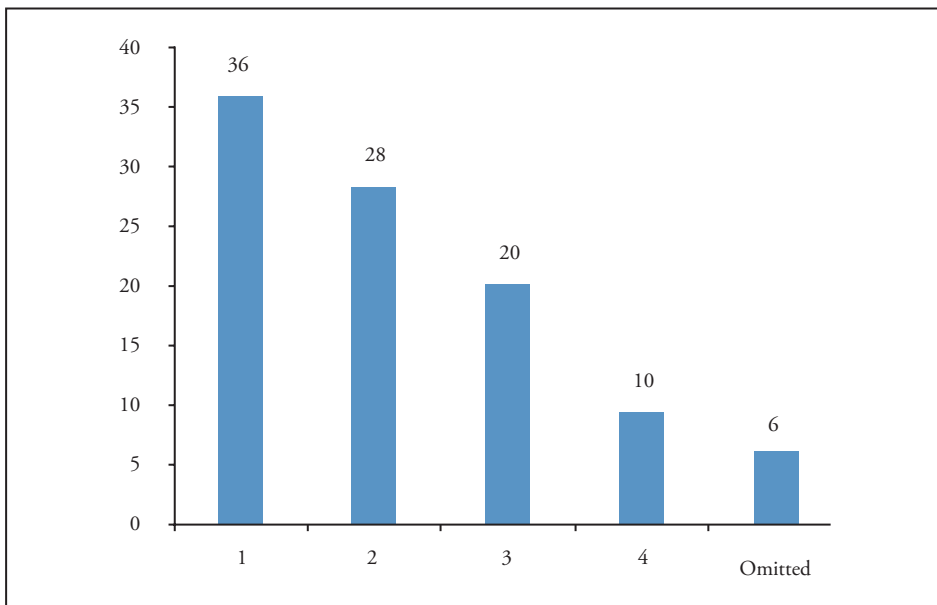
Direction: Family tree of Meena is shown below. Based on the figure, answer the questions 45, 46 and 47.

Bimla (Mother)	Dinanath (Father)

Sunita (Sister)	Meena	Rakesh (Brother)
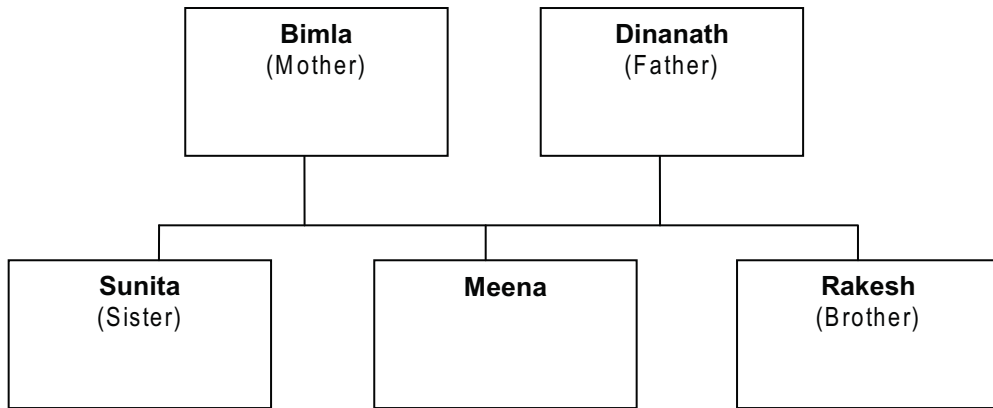
Sample item: Reasoning	**Scale score:** 234
Item 46. Rakesh and his wife are blessed with a son. What will be the son's relationship with Dinanath? 1. Grandson 2. Son 3. Brother 4. Brother-in-law	

This item requires students to find out the relationship on the basis of information given in the family tree. The scale score of this item was 234, i.e., below the average level of difficulty of items in the survey. As many as 58% of students in the sample were able to select the correct answer (1). The figure shows how the remaining 42% responded.

Figure 7.7 (Item 46): Percentage of students in each response category
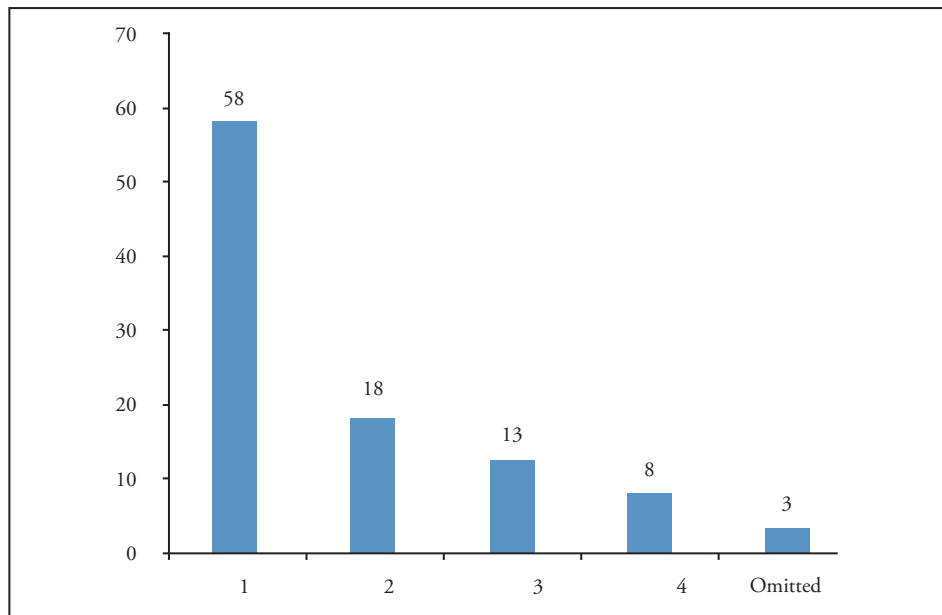
Sample item: Reasoning	**Scale score:** 240
Item 45. Rakesh gets married. What will be the relation of his wife with Meena? 1. Sister 2. Sister-in-law 3. Mother 4. Daughter-in-law	

This item requires students to think about the relationship as per information given in the family tree. The scale score of this item was 240, i.e., close to the average level of difficulty of items in the survey. As many as 54% of students in the sample were able to select the correct answer (2). The figure shows how the remaining 46% responded.

Figure 7.8 (Item 45): Percentage of students in each response category
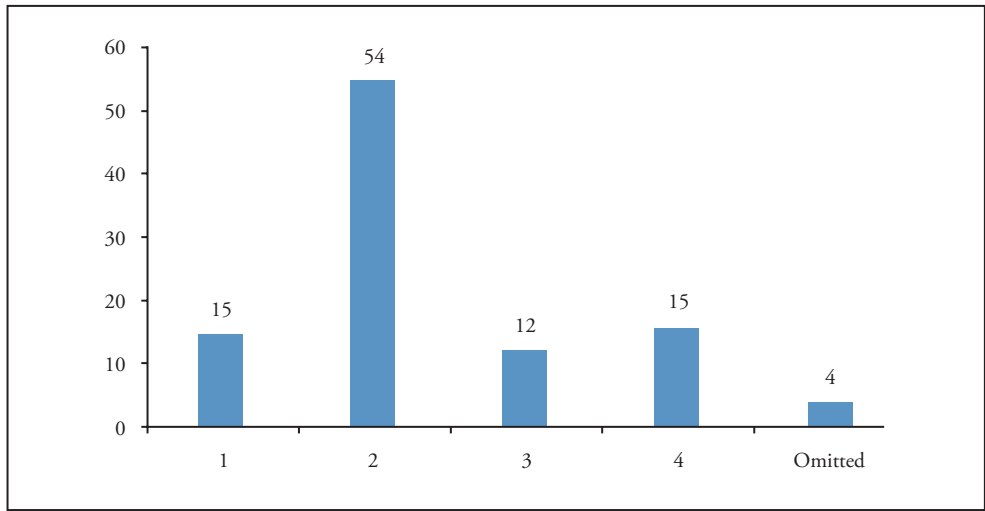
Sample item: Reasoning	Scale score: 250

Item 47.   Rakesh is transferred to some other place and lives like a nuclear family.
Now how many members are staying in Meena's family?
> 1.   4
> 2.   5
> 3.   6
> 4.   7

This item requires students to analyse the situation and find out the number of persons in the family. The scale score of this item was 250, i.e., the average level of difficulty of items in the survey. As many as 51% of students in the sample were able to select the correct answer (1). The figure shows how the remaining 49% responded.

Figure 7.9 (Item 47): Percentage of students in each response category
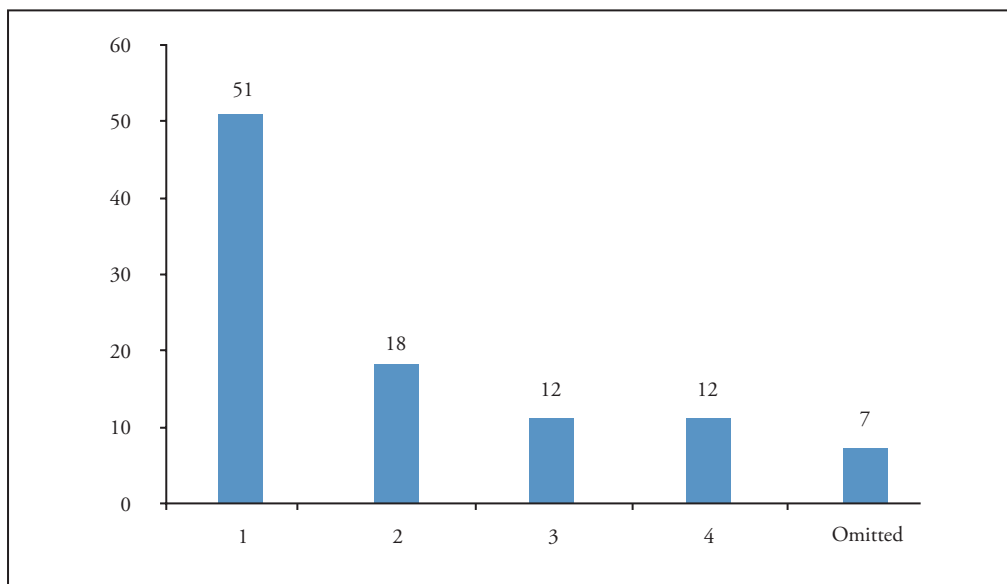
Performance on the sample items reproduced here varied across the country. Table 7.2 shows the proportion of students in each state or UT correctly responding to each item. The states/UTs are grouped according to the language in which the EVS tests were presented as some variation in performance may be due to translation effect.

States and UTs	Medium	Item 3 (%)	Item 9 (%)	Item 33 (%)	Item 44 (%)	Item 45 (%)	Item 46 (%)	Item 47 (%)	Item 49 (%)	Item 61 (%)
All sample		**79**	**50**	**49**	**36**	**54**	**58**	**51**	**36**	**81**
Tripura	Bengali	50	57	55	69	57	69	58	47	88
West Bengal**	Bengali	90	58	69	32	65	76	64	30	93
A & N Islands	English	69	37	41	31	42	42	36	28	77
Chandigarh	English	69	49	31	24	42	51	42	29	86
Goa*	English	77	57	19	22	50	45	41	34	78
Meghalaya**	English	73	39	50	35	47	49	43	41	76
Nagaland**	English	78	52	56	34	51	52	31	36	78
Sikkim**	English	85	44	42	20	42	42	36	25	80
Gujarat	Gujarati	81	59	53	33	80	30	43	22	70
Daman & Diu*	Gujarati	79	61	52	34	72	24	50	25	76
Bihar	Hindi	76	43	61	41	44	56	41	30	76
Chhattisgarh	Hindi	70	44	46	34	45	60	48	40	64
Delhi	Hindi	85	40	47	40	57	70	58	38	90
Haryana	Hindi	70	34	31	26	40	53	49	29	87
Himachal Pradesh	Hindi	76	45	39	30	49	56	53	33	80
Madhya Pradesh	Hindi	83	60	68	53	53	70	58	36	84
Rajasthan	Hindi	72	39	48	47	54	61	55	39	80
Uttar Pradesh	Hindi	87	65	64	64	64	77	68	53	89
Uttarakhand	Hindi	78	43	47	38	44	52	44	26	82
Jharkhand**	Hindi	80	51	53	47	52	59	43	35	82
Karnataka	Kannada	86	64	45	39	61	64	52	35	82
Kerala*	Malayalam	89	64	27	20	64	66	81	50	88
Maharashtra*	Marathi	86	48	52	35	56	68	56	45	83
Mizoram**	Mizo	87	56	60	21	38	58	68	38	93
Orissa	Oriya	77	52	58	38	57	67	41	33	72
Punjab	Punjabi	72	36	50	26	39	51	45	28	91
Puducherry	Tamil	75	43	37	18	38	37	39	17	64
Tamil Nadu	Tamil	89	70	71	60	72	66	70	57	88
Andhra Pradesh	Telugu	70	48	24	29	70	64	40	39	81
Assam*	Multiple	81	52	32	23	61	64	51	31	74
Jammu & Kashmir	Multiple	74	54	56	54	58	60	46	43	71

Table 7.2: Performance on the sample Items in states and UTs

1. States/UTs marked * achieved samples representing <80% of the target population.
2. States/UTs marked ** tested students in Class VI.
3. Assam tested students in Assamese and Bengali. Jammu & Kashmir tested students in English, Hindi and Urdu.

7.4 What can students do in EVS?

In this chapter it has already been mentioned what the students performing at different levels of content domain on EVS items can do. The items in EVS were developed on the following content areas:

- **Family and Environment**

  i)   Family life

  ii) Work and play

  iii) Animal life

  iv) Plant life

- **Food**

  i)   Food hygiene

  ii) Preservation

  iii) Cooking

  iv) Eating habits

  v)   Nutritional deficiencies and related diseases

  vi) Sense of taste and digestion

- **Shelter**

  i)   Different types of housing

  ii) Need for sharing resources and space

  iii) Neighbourhood and community living

  iv) Times of emergency

- **Water**

  i)   Sources of water and irrigation

  ii) Animals and plant life in water

  iii) Floating and solubility in water

  iv) Stagnant and flowing water

- **Travel**

  i)   Fuels used in vehicles

  ii) Renewable and non-renewable energy

  iii) Travelling in the mountains

  iv) Expedition and spirit of adventure

  v)   Different modes of transport

- **Real Life**

  i)   Things we make and do

  ii) Children's ideas

  iii) Observation reports

  iv) Expression of experiences

  v)   Process of experiment

Given below are the tables showing the performance of students of class V on various cognitive processes or skills on different content areas.

7.4.1 Family & Environment

Table 7.3: Performance of class V students on the content area of Family and Environment								
Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No	Scale value	% correct	Item No	Scale value	% correct	Item No	Scale value	% correct
11	235	56	18	197	73	27	264	44
2	184	75	19	185	74	40	249	50
51	209	68	26	251	49	47	250	50
61	172	81	3	182	79	50	225	60
71	225	59	5	211	68	70	338	34
			33	256	48	78	253	48
			34	273	42	79	246	51
			36	264	42	80	254	47
			45	240	54			
			43	284	41			
			46	234	57			
			53	228	60			
			58	291	39			
			63	203	70			
			64	269	41			
			72	225	59			
			77	214	65			

Knowing (Skill 1)

■ Around 80% students in the country know the name of the bird (ostrich) which cannot fly (Item 61).

■ About half of the students can relate characteristics of plants with their habitat (Item 11).

Applying (Skill 2)

■ Nearly three-fourths of the students can classify the animals in two groups, i.e., domestic and wild animals (Item 3) and can identify the footprints of birds (Item 19).

■ Only 41% students are able to know the relationship between inhaling and exhaling of air and expansion of chest (Item 43).

Reasoning (Skill 3)

■ Nearly 60% students can reason out that the larger animals have low heartbeat per minute as compared to smaller size animals (Item 50).

■ About one-third students can explain the benefits of forests for human beings (Item 70).

7.4.2 Food

Table 7.4: Performance of class V students on the content area of Food								
Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No	Scale value	% correct	Item No	Scale value	% correct	Item No	Scale value	% correct
12	249	50	21	290	42	22	228	54
1	230	56	35	250	50			
41	290	40	48	333	31			
52	270	42	76	237	54			
62	289	44						

Knowing (Skill 1)

- About 50% students know about the best source of iron (Item 1) and the cause of night blindness (Item 12).

Applying (Skill 2)

- More than half of the students can identify the foods that come from animals (Item 76).
- Less than one-third students in the country can select the food material which can give energy to human body (Item 48).

Reasoning (Skill 3)

- More than half of the students can reason out that it is safe to wear cotton clothes rather than silk, nylon and terricot clothes while cooking food (Item 22).

7.4.3 Shelter

Table 7.5 : Performance of class V students on the content area of Shelter								
Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No	Scale value	% correct	Item No	Scale value	% correct	Item No	Scale value	% correct
14	215	66	24	240	54	28	240	53
			32	251	49			

Knowing (Skill 1)

- Nearly two-thirds of the students know how to find the solution in a given situation (Item 14).

Applying (Skill 2)

- Nearly half of the students can relate the different types of roofs with geographical condition and can also explain the reason behind the construction of dams (Item 24, 32).

Reasoning (Skill 3)

- About half of the students can reason out that population explosion is the root cause of unemployment and housing problems in India (Item 28).

7.4.4 Water

Table 7.6: Performance of class V students on the content area of Water								
Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No	Scale value	% correct	Item No	Scale value	% correct	Item No	Scale value	% correct
13	185	77	20	231	58	30	250	50
42	201	72	6	218	63	38	215	66
			9	249	50	8	211	68
			55	199	71	67	218	63
			75	220	63			

Knowing (Skill 1)

■ About three-fourths of the students know about the diseases spread by mosquitoes (Item 13) and the animals that can live both on land and water (Item 42).

Applying (Skill 2)

■ More than half of the students know the sources of water and its usage (Item 20).

■ Nearly three-fourths of the students know that salt can dissolve in water (Item 55).

Reasoning (Skill 3)

■ Nearly three-fourths of the students in the country can interpret the given graph and find out the particular day on which maximum rainfall occurred (Item 8) and know about the best usage of water (Item 38).

7.4.5 Travel

Table 7.7: Performance of class V students on the content area of Travel								
Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No	Scale value	% correct	Item No	Scale value	% correct	Item No	Scale value	% correct
15	262	44	17	264	45	25	238	55
			4	218	62			
			37	252	49			
			44	296	35			
			54	213	66			
			57	261	46			
			65	277	41			

Knowing (Skill 1)

■ Less than half of the students know about the forms of energy commonly used at home (Item 15).

Applying (Skill 2)

■ About two-thirds of the students in the country understand that motor driven vehicles cause more pollution as compared to non-motor driven vehicles (Item 54).

■ Only one-third students know about the sources of energy which produces carbon dioxide (Item 44).

Reasoning (Skill 3)

■ More than half of the students know the reason that Earth looks bluish in colour when seen from the outer space due to the oceans (Item 25).

7.4.6 Real Life

Table 7.8: Performance of class V students on the content area of Real Life								

Knowing (Skill 1)			Applying (Skill 2)			Reasoning (Skill 3)		
Item No	Scale value	% correct	Item No	Scale value	% correct	Item No	Scale value	% correct
16	351	30	23	333	26	29	242	53
7	250	50	66	263	47	39	272	42
31	260	45	68	224	59	10	272	42
73	245	51	69	263	44	49	302	35
			74	245	51	56	237	55
			59	241	54			
			60	238	55			

Knowing (Skill 1)

■ Nearly half of the students know about the instrument used for measuring the body temperature (Item 73).

■ Only 30% students know that lunar eclipse occurs when the earth is between the sun and the moon (Item 16).

Applying (Skill 2)

■ About half of the students can identify the substances which cannot absorb in water from the given picture (Item 74).

■ Only 26% students can relate the measuring apparatus with the quantity of water (Item 23).

Reasoning (Skill 3)

■ More than half of the students can reason out that paint does not dissolve in water but it dissolves in kerosene (Item 56).

■ Less than 40% students know that it is the water vapour that clouds the mirror when we breathe on it (Item 49).

Chapter 8

Student-related Variables

CHAPTER 8 STUDENT-RELATED VARIABLES

Part I-Profile

The majority of results in this chapter relate to the total respondents to the student questionnaire without weighting. Overall figures are reported, as well as some illustrative results from individual states/UTs. It should, however, be noted that in five states/UTs— Assam, Daman & Diu, Goa, Kerala and Maharashtra—the population coverage fell below 80% mainly due to the Upper Primary Only school exclusion (see Chapter 1). Some results connect the background variables with test scores on the three subjects. In this situation, results refer to approximately two-thirds of respondents with both background factors and test scores on the relevant subject. Again, these results are presented without weighting.

The data in this chapter is derived from questionnaires completed by 1,17,653 students studying in 6,411 schools of 274 districts of 31 states all over the country. This chapter covers detailed information on the students and school-related variables which have been categorised as follows:

- Students' background
- Resources available at home
- Resources available in school
- Students' activities outside the school

In the tables and figures of this chapter, standard errors are reported in brackets along with relevant statistics unless otherwise mentioned.

8.1 Students' Background

The variables covered in this category are gender, social groups, language used at home and school, number of siblings, and whether they are physically challenged etc.

8.1.1 Student Gender

The gender distribution of students is given in Figure 8.1. Overall the sample comprises 49% boys and 51% girls. In Appendix VII, Table A-7.1 gives the percentage of sampled boys and girls by state.

Figure 8.1: Gender of Students
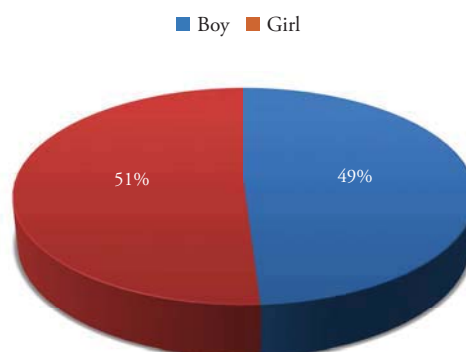
8.1.2 Category distribution of students

The Government of India has officially documented castes and sub-castes, primarily to determine those deserving reservation in education and jobs. The whole population is divided into four caste categories – SC, ST, OBC and Others. Figure 8.2 shows that 20% of those in the survey were SC students, 19% ST students, 32% OBC students, and 29% Other students.

Figure 8.2: Student categories
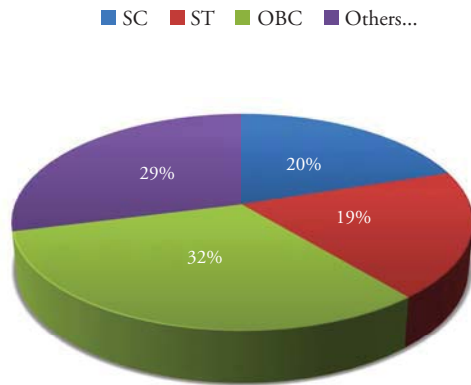
8.1.3 Language used at home

Teaching to students in their mother tongue is emphasised by the government and policy makers. Figure 8.3 shows the percentage of students speaking the same language at home as the one used in the school. As many as 66% of students reported that they spoke the same language at home and remaining 34% of students used a different language.

Figure 8.3: Language usee in home
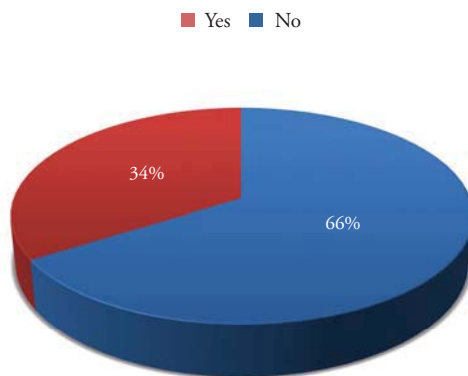
8.1.4 Number of siblings

Figure 8.4 shows the percentage distribution of number of siblings, categorised into having no sibling, one sibling, two siblings and three and more siblings. Around 52% of students had three or more siblings and 9% of students had no siblings.

Figure 8.4: Number of siblings
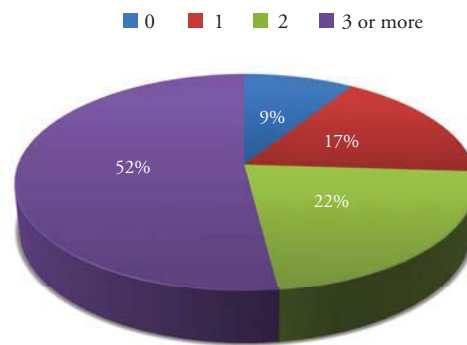
8.1.5 Physically challenged students

Figure 8.5 indicates that 7% of students were physically challenged.

Figure 8.5: Physically challenged students
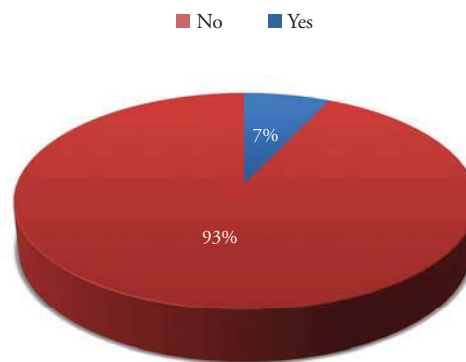
8.2 Resources Available at Home

Students with more educational resources tend to attain better than those who do not. This survey focused on some of the variables such as parents' level of education, their occupation and resources available at home that facilitate learning of the students.

8.2.1 Educational status of parents

Parents are the first teachers of the students and they play a pivotal role in the achievement of their children. Figure 8.6 describes the educational status of the parents of class V students.

Figure 8.6: Parental education
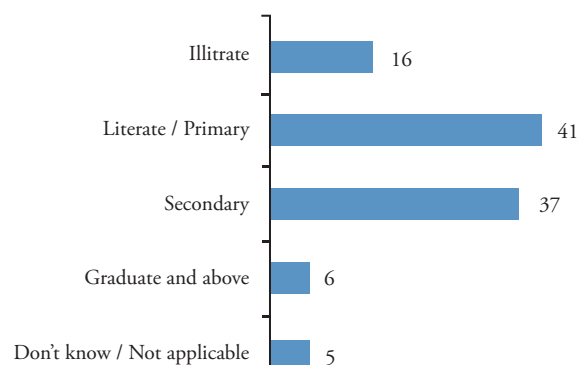
8.2.2 Parents' occupation

In this survey, occupations have been grouped into broader categories. Figure 8.7 provides the distribution of students on the basis of their parents' occupation. Results reported were unemployed (12%), housewives (2%), agricultural labourer/servant/vendor/ street labourer (35%), farmer (22%), skilled/office worker/ shopkeeper/businessman (24%), teacher/professor/manager (4%).

Figure 8.7: Parental occupation
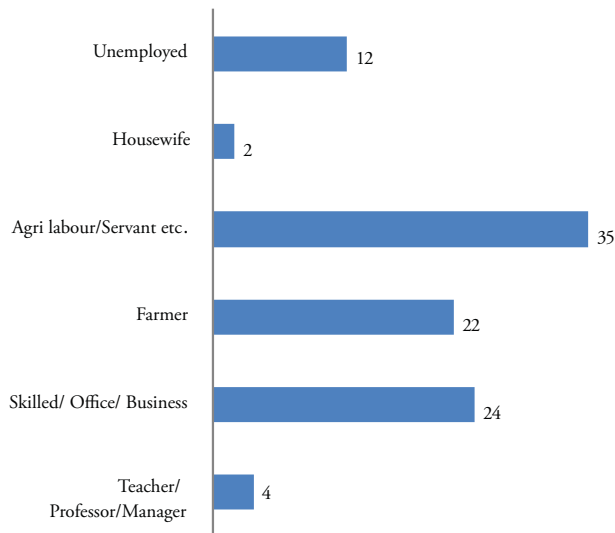
8.2.3 Below Poverty Line (BPL) card

The Poverty Line is an economic benchmark and threshold used by the Government of India, but varies between states, to identify individuals and households in need of government assistance and aid. Overall, 47% of students reported their family had a BPL card and 21% of students do not know (Figure 8.8).

Figure 8.8: Below Poverty Line
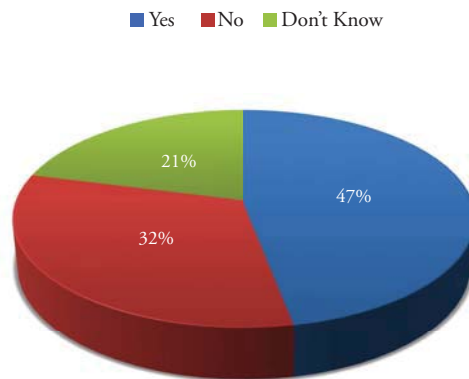
8.2.4 Literacy resources at home

In view of the importance of literacy resources in enhancing the learning of the students, information was sought about the availability of some literacy resources, e.g., calculator, computer, study desk, dictionary, internet, daily newspapers and magazines at home. A wide variation from study desk (49%) to internet access (7%) was observed. These are shown in Figure 8.9.

Figure 8.9: Resources in home
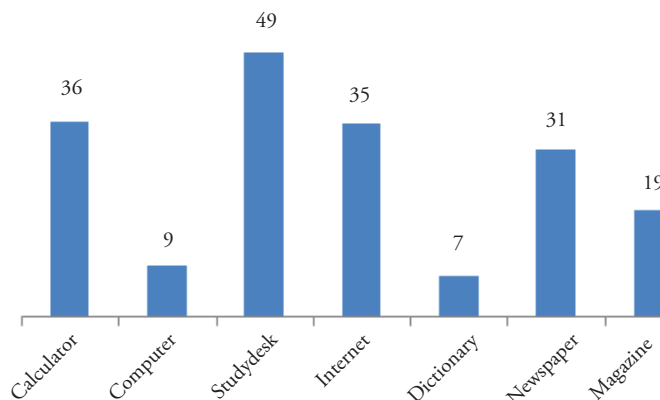
8.2.5 Books at home

The availability of books at home has been categorised into having no books, 10 books, 11–25 books and more than 25 books. Figure 8.10 shows that 40% students reported having no books in their home and the highest percentage (41%) of students reported having 1–10 books. Only 11% reported having more than 25 books and 8% had 11–25 books.

Figure 8.10: Books in the home
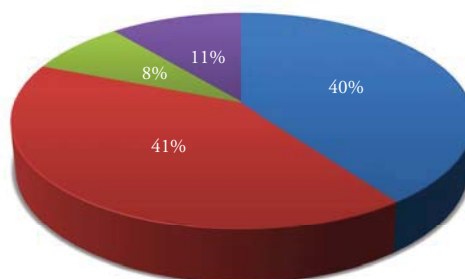
8.3 Resources Available in School

Schools are almost like a second home for the children as this is the place where they spend one-third of their time. This survey has covered some of the important variables like what they think about their school, teaching and learning processes in the school, etc.

8.3.1 Teaching and learning process

Teaching and learning process includes many activities inside and outside the school. Some of the variables which play a significant role in the process such as homework, textbooks and activities important for teaching have been covered.

8.3.2 Help in studies

Figure 8.11 shows the percentage of students getting help from different quarters. More than 58% of students reported getting help in their studies from different members of their families such as father (66%), mother (58%),

elder brother and sister (69%), and 32% of students reported that they did not get any help from anybody. Around 44% of students reported getting help from tutor.

Figure 8.11: Help with homework
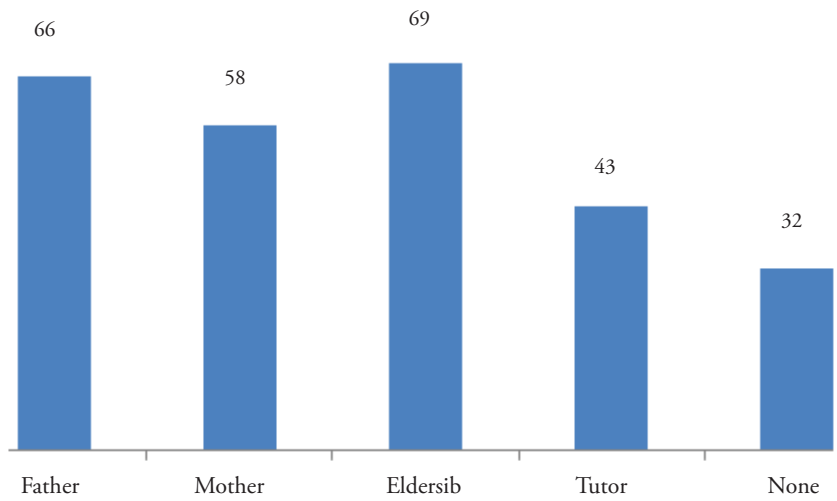
8.3.3 Private tuition

Taking private tuition is a common practice nowadays. Keeping in mind that quality education should be provided by the teacher in the classroom, government has restricted the school teachers from providing tuition. However, it exists in one way or the other in response to parental demand. Figure 8.12 shows that overall, 31% of students said they were taking private tuition.

Figure 8.12: Private Tuition
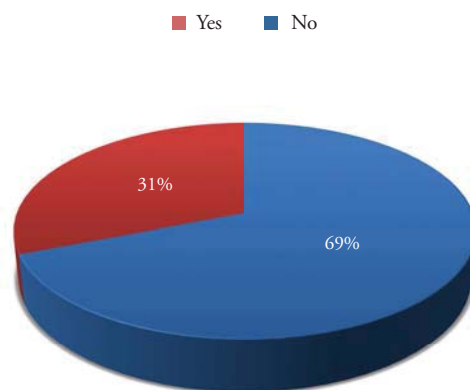
8.3.4 Having textbooks

Not much variation was found across the states. Overall, at least 97% of students reported having textbooks of each of the three subjects (Figure 8.13).

Figure 8.13: Have textbook?

97(0.1)	98(0.1)	97(0.1)
Language	Mathematics	EVS
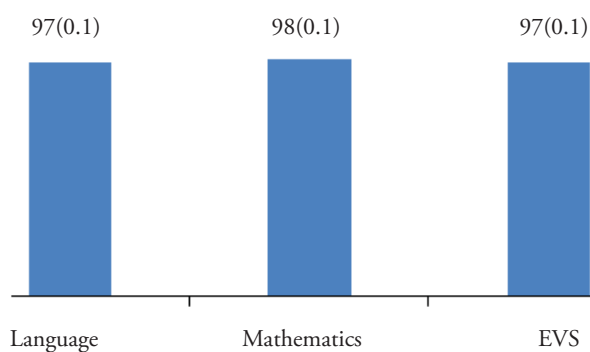
8.3.5 Students' attitude towards school

Students were asked about their likes and dislikes about school. On an average, over 90% reported that they liked to be in school and that their teachers wanted them to do their best. About 81% of students said that students in their school tried to do their best.

8.4 Students' Activities outside the School

All-round development of the students comes not just from what they learn from the school but also from activities outside the school. The survey gathered information on some of the important activities outside the school, such as their reading habits (books, newspapers, magazines), watching television, interaction with their friends, discussion with their friends about the lessons in the school, sharing with their parents what they learn in school, helping family members by doing household chores, and how often they mixed with their peer group.

The data indicated that daily, nearly 67% students watched TV, 78% interacted with their friends, 82% played sports/games, 33% read books for enjoyment, 81% did the homework given at school and 64% shared with their family what they learnt in the school. As many as 75% of students never used a computer outside the school.

When asked about helping in the household chores, about 69% of students reported that they looked after the family members, 62% helped in cleaning the house and 32% helped in preparing food daily.

Part II-Student Background and Attainment

Home background is a crucial factor in the development of intellectual abilities. These can include personal characteristics that affect the way a young person's abilities can progress, such as gender, geographical region and social labels such as caste. Chapters 2, 4 and 6 of this report have already indicated for different subjects the apparent lack of an overall effect of gender and region, and the substantial effect of caste on performance of the students.

It is also true worldwide that socio-economic circumstances and the correspondence of the home language and the language of school instruction have a major effect on the success of individuals in the education system (OECD, 2010). In all the analyses in this chapter, the relation with aspects of these is considered on its own. An index of socio-economic situation is then derived from a combination of such background factors.

Because of their importance to educational success, socio-economic status and language together are described as 'key variables' and the following method of analysis is adopted:

- First, the raw relation ('bivariate') between the background variable and the outcome, in different subjects, is presented and then the relation is presented after allowing for these two 'key' variables.

- One category, usually the largest, is designated as a 'base' category and assigned a zero value, and all other categories are defined in terms of their difference from the base result.

- Since these key variables are a very important aspect of attainment, it often, though by no means unfailingly, happens that including such other key variables in the regression means that the apparent univariate relationship is diluted.

If a relation between a factor and an outcome is not extinguished by making such allowances, it is reasonable to suggest that the factor is having an effect on the outcome.

The information in this chapter comes from the pupil questionnaire. Some studies of student attainment include a parental questionnaire, but, while further information on parental practices in encouraging education would have been of interest, it is important to bear in mind that the primary focus of this study was not to explain differences in attainment, but to compare the levels of attainment of entities in the national system, and hopefully, to lay the foundation for a comparative series investigating the progress of attainment over time. The study was also primarily a very ambitious school-based exercise, and so practicalities meant that contacting large numbers of parents for this purpose would not have been feasible. Activities related to academic learning and students' characteristics were considered for analyses.

8.5 Socio-economic Index

The first 'key' variable is socio-economic index in which literary and other resources at home were combined to form an index of socio-economic resources. The details of its construction are described more fully in Appendix V. It is a weighted combination of parental education, parental occupation, number of possessions, and number of books at home.

8.6 Language Spoken at Home

The second 'key' variable considered is speaking the language of instruction at home. It is to be expected that students familiar with the language used will find coping with the day-to-day business of school easier, and are likely to make more progress.

8.7 Treatment given to Variables used in Analysis

The variables considered under the pupil background are as under:

Table 8.1: Pupil-related variables and its treatment for regression variables

Variables	Categories	Treatment
Gender	a) Boys, b) Girls	'BOYS' as a base category
Category	a) Scheduled Castes, b) Scheduled Tribes, c) OBCs, d) Others	'OTHERS' as a base category
Mode of conveyance	a) Walk, b) On cycle or rickshaw, c) By bus, d) Other modes	'WALK' as a base category
Number of siblings	0, 1, 2, or more	As quasi-continuous variables
Physically challenged	a) Yes, b) No	'NO' as a base category
Subject textbooks	a) Yes, b) No	'NO' as a base category
Getting help in studies	a) Father, b) Mother, c) Elder sibling, d) Tutor, e) None	'NONE' as a base category
Taking private tuition	a) Yes, b) No	'NO' as a base category
Homework checked at home	a) Family member, b) Tutor, c) Friend, d) None	'NONE' as a base category
Homework checked at school	a) Family member, b) Tutor, c) Friend, d) None	'NONE' as a base category
Read material other than course material	a) Read comic books, b) Read stories or novels, c) Read books that explain things,	As quasi-continuous variables
Activities outside the school	a) Watch television or videos, b) Work with computer, c) Interact with friends, d) Play sports or games, e) Read a book for enjoyment, f) Use the internet, g) Do your homework, h) Discuss with your friends what you learned in school, i) Tell your family about what you learned in school	As quasi-continuous variables
Household tasks	a) Looking after your family, b) Preparing food, c) Cleaning the house	As quasi-continuous variables
Attitude towards subject	LANGUAGE: a) You enjoy learning Language, b) Language is easier for you than other subjects, c) Language is easier for you than for other students, d) You read silently on your own	Sum of agree responses to the questions
	MATHEMATICS : a) You usually do well in mathematics, b) You would like to do more mathematics in school, c) Mathematics is harder for you than for many of your classmates	
	EVS: a) You usually do well in EVS/Science/Social Science, b) You would like to do more EVS/Science/ Social Science in school, c) EVS/Science/ Social Science is harder for you than for many of your classmates, d) You like to ask questions in your EVS/Science/Social Science class, e) You learn things quickly in EVS/Science/Social Science, f) EVS/Science/Social Science is boring, g) You enjoy learning EVS/Science/Social Science, h) Your teacher asks questions in the class	

8.8 Student Background Factors

8.8.1 Gender-wise

Table 8.2: Regression results – Gender-wise

Variables		Language			Mathematics			EVS		
		Coeff	SE	Sig.	Coeff	SE	Sig.	Coeff	SE	Sig.
Without key variables	Girls	1.85	0.64	**	−1.70	0.61	**	−0.12	0.51	NS
With key variables	Girls	1.74	0.63	**	−1.65	0.61	**	−0.15	0.51	NS

*Significant if P<.05 , **Significant if P<.01, NS-Not Significant

Table 8.2 indicates that only in Mathematics do boys appear to do better than girls. The coefficient of -1.70 means that, on average, girls scored 1.70 scale score points less than the boys. This difference is small but, for this subset of the population, it is statistically significant. In the case of Language, girls in this sample performed better than boys by a small but statistically significant margin. In EVS, there is no significant difference in the performance of boys and girls. The same trends were observed after entering the key variables.

8.8.2 Category-wise

Table 8.3: Regression results – Category-wise										
Variables		**Language**			**Mathematics**			**EVS**		
		Coeff	SE	Sig.	Coeff	SE	Sig.	Coeff	SE	Sig.
Without key variables	SC	−6.65	0.97	**	−6.42	1.28	**	−5.83	1.06	**
	ST	−8.08	1.13	**	−13.16	1.27	**	−4.39	1.50	**
	OBC	−2.82	1.09	**	−0.38	1.12		−0.73	1.01	NS
With key variables	SC	−5.00	0.93	**	−6.10	1.24	**	−5.21	1.07	**
	ST	−5.64	1.08	**	−11.74	1.26	**	−2.66	1.45	NS
	OBC	−1.76	1.04	NS	−0.19	1.09	NS	−0.42	1.01	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 8.3 reveals that the SC and ST category students significantly underperformed as compared to students of 'Others' category in all the three subjects. The same trend is observed with key variables.

In case of Language only, the students of OBC category poorly performed as compared to students of 'Others' category without key variables only. However, with the key variables, the difference was not significant.

8.8.3 Siblings-wise

The number of siblings a child has is likely to affect the amount of attention which his or her parents can accord, though to some extent, this can be offset by the other members of the family. It is also likely to affect the amount of other resources available to each member. Table 8.4 shows the relationship between number of siblings and attainment in different subjects.

Table 8.4: Regression results – Siblings-wise									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	SE	Sig.	Coeff	SE	Sig.	Coeff	SE	Sig.
Without key variables	−1.87	0.21	**	−0.44	0.21	*	−1.04	0.19	**
With key variables	−0.99	0.21	**	−0.08	0.21	NS	−0.63	0.20	**

*Significant if P<.05 , **Significant if P<.01, NS–Not Significant

Table 8.4 shows that for each additional sibling, there is, on an average, a decline in attainment of 1.87, 0.44 and 1.04 scale score points in Language, Mathematics and EVS respectively. The size of this relationship is reduced, though not removed, by allowing for key variables, suggesting that some of this difference may be due to scarcity of resources.

8.8.4 Physically challenged

Table 8.5: Regression results – Physically challenged students									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	–13.06	1.16	**	–14.22	1.43	**	–10.61	1.71	**
With key variables	–13.27	1.15	NS	–14.07	1.42	NS	–10.55	1.69	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

It is evident from Table 8.5 that pupils classified as physically challenged performed substantially low than the rest of the students both without and with key variables in all the three subjects.

Physically challenged students do substantially worse than the rest of the population, suggesting that more could be done improve their access to education.

8.8.5 Mode of conveyance

An important aspect of school attendance is, naturally, getting there. Unfortunately, the question on length of time to get to school gave some difficulties to respondents, and it has not proved possible to use the responses to this question. Students were also asked what means of transport they used to get to school.

Table 8.6: Regression results – Students using different modes of conveyance										
Variables		**Language**			**Mathematics**			**EVS**		
		Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	Bicycle	2.68	1.33	*	–2.21	1.52	NS	–3.58	1.33	**
	Bus	7.74	1.72	**	–5.00	2.05	*	–2.52	1.80	NS
	Other	10.81	2.12	**	–1.11	2.20	NS	–1.06	2.00	NS
With key variables	Bicycle	–1.69	1.28	NS	–3.26	1.45	*	–5.27	1.32	**
	Bus	3.69	1.61	*	–5.71	1.97	**	–4.07	1.75	*
	Other	5.14	2.00	*	–2.52	2.08	NS	–3.24	1.96	NS

Significant if P<.05 , **Significant if P<.01, NS–Not Significant

Table 8.6 indicates that the mode of conveyance to school does not impact the achievement level of students substantially. In Mathematics it was seen that the students using bus as a means of conveyance underperformed significantly than the students who walked to school.

In Language, students using other means to attend the school do slightly better, but this is halved for bus and other, and disappears entirely for bicycle transport after allowing for key variables, suggesting that much of this apparent difference may be due to resources. However, in EVS, students using bicycle to attend the school performed significantly lower than the students who walked to school.

The trend in different subjects clearly indicates that the performance of the students who walked to school was better than those students who are using other means of conveyance.

8.8.6 Subject textbooks

One other important resource is a textbook in the subject.

Table 8.7: Regression Results – Students having subject textbooks									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	8.46	1.75	**	11.82	2.13	**	8.58	2.15	**
With key variables	7.75	1.70	**	11.17	2.20	**	8.05	2.09	**

*Significant if P<.05 , **Significant if P<.01, NS–Not Significant

Students who do not have a textbook in the subject performed poorly as compared to those who have a textbook in all the subjects.

8.8.7 Attitude towards subject

Having a positive attitude to the subject is related to better performance.

Table 8.8: Regression results – Students attitude towards different subjects									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	3.74	0.36	**	2.84	0.28	**	3.19	0.27	**
With key variables	3.16	0.35	**	2.68	0.28	**	3.01	0.26	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Positive attitude of students towards different subjects has shown positive impact on their achievement.

In each case, better performance accompanies more positive views. Allowing for resources has little effect.

8.8.8 Getting help in studies

Table 8.9: Regression results – Students getting help in studies									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	5.04	1.13	**	2.84	1.37	*	3.19	1.18	**
With key variables	−0.18	1.15	NS	1.32	1.34	NS	1.08	1.21	NS

*Significant if P<.05 , **Significant if P<.01, NS–Not Significant

From Table 8.9 it can be seen that there was positive impact of getting help in studies from the family members on achievement of students in all the three subjects without including key variables.

8.8.9 Taking private tuition

Table 8.10: Regression results – Students taking private tuition									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	−0.83	0.84	NS	0.11	0.86	NS	−1.41	0.92	NS
With key variables	−3.65	0.85	**	−0.84	0.84	NS	−2.82	0.92	**

*Significant if P<.05 , **Significant if P<.01, NS–Not Significant

From the table it can be interpreted that private tuition did not have significant effect on students' achievement without key variable. However, after allowing for key background variables, it was seen that pupils who had a tutor do well in Language and EVS.

8.8.10 Homework checked at home

Table 8.11 Regression results − Students getting homework checked at home								

Variables	Language			Mathematics			EVS		
	Coeff	SE	Sig.	Coeff	SE	Sig.	Coeff	SE	Sig.
Without key variables	2.75	0.95	**	3.36	1.05	**	1.77	0.93	NS
With key variables	−1.21	0.95	**	2.12	1.04	*	0.27	0.97	NS

*Significant if P<.05, **Significant if P<.01, NS−Not Significant

Generally it is thought that pupils who have their homework checked at home would do better than those who don't. The survey confirms the same in case of Language and Mathematics also. But when key variables were allowed, the results appear differently in case of Language.

8.8.11 Homework checked at school

Table 8.12: Regression results − Students getting homework checked at school								

Variables	Language			Mathematics			EVS		
	Coeff	SE	Sig.	Coeff	SE	Sig.	Coeff	SE	Sig.
Without key variables	12.77	1.89	**	11.86	1.93	**	11.30	1.98	**
With key variables	11.50	1.80	**	11.74	1.89	**	11.26	1.96	**

*Significant if P<.05, **Significant if P<.01, NS−Not Significant

Pupils who have their homework checked at school by the teacher do substantially better than those who don't. This was proved by the results in all the three subjects. It was also true when key variables were allowed.

8.8.12 Learning-related home activities

In addition to formal homework or tutoring, students' out-of-school activities may influence their learning development in other ways, either positive or negative. Some activities may be directly related to subject taught in school, others less so.

Table 8.13: Regression results − Students who read material other than course material outside the school									

Variables		Language			Mathematics			EVS		
		Coeff	SE	Sig.	Coeff	SE	Sig.	Coeff	SE	Sig.
Without key variables	Comic books	2.20	0.37	**						
	Stories or novels	2.36	0.45	**						
	Books that explain things	3.09	0.36	**				3.15	0.43	**
	Magazine	2.12	0.37	**				2.45	0.40	**
	Newspaper	4.26	0.35	**				4.00	0.40	**
	Read directions	3.30	0.39	**	3.07	0.41	**	3.64	0.37	**
With key variables	Comic books	1.11	0.37	**						
	Stories or novels	1.16	0.43	**						
	Books that explain things	2.34	0.36	**				2.77	0.42	**
	Magazine	1.13	0.37	**				1.92	0.40	**
	Newspaper	2.98	0.37	**				3.49	0.41	**
	Read directions	2.60	0.39	**	2.79	0.41	**	3.28	0.37	**

*Significant if P<.05, **Significant if P<.01, NS−Not Significant

All activities indicated above are related with better performance in different school subjects, even the less likely activities such as reading comic books or reading directions or instructions—and the more frequently, the higher the performance. Allowing for the key variables reduces the relationship but it is still significant. While it seems likely that such activities would relate, at least to some extent, to reading performance, some other activities are clearly not directly related and might be thought to subtract from learning opportunities.

8.8.13 Other home activities

Students were asked whether they indulged in non-reading activities at home.

Table 8.14: Regression results – Students doing various activities outside the school										
Variables		**Language**			**Mathematics**			**EVS**		
		Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	TV	2.11	0.42	**	0.46	0.50	NS	1.56	0.45	**
	Computer	0.15	0.38	NS	−1.81	0.50	**	−0.82	0.47	NS
	Friends	1.72	0.48	**	1.78	0.47	**	1.77	0.52	**
	Sports	0.67	0.57	NS	4.42	0.45	**	2.89	0.54	**
	Internet	1.47	0.36	**	1.98	.47	**	2.13	0.37	**
	Tell friends about school	4.70	0.42	**	5.12	.42	**	5.45	.41	**
	Tell family about school	4.54	0.41	**	3.23	.43	**	3.94	.47	**
With key variables	TV	0.85	0.42	*	−0.01	0.50	NS	0.99	0.45	*
	Computer	−0.98	0.37	**	−2.18	0.49	**	−1.40	0.47	**
	Friends	1.31	0.47	**	1.62	0.46	**	1.59	0.52	**
	Sports	0.36	0.55	NS	4.21	0.45	**	2.77	0.52	**
	Internet	0.98	0.37	**	1.59	.46	**	1.77	0.37	**
	Tell friends about school	4.14	0.41	**	4.88	.42	**	5.15	.41	**
	Tell family about school	3.70	0.41	**	3.13	.43	**	3.63	.47	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Watching TV, hanging out with friends, using internet, and telling friends and family about the studies in school all appear to be related to higher attainment, though on the whole, less so after allowing for the key variables in Language. However, in Mathematics and EVS, hanging out with friends, participation in sports, using internet, and telling friends and family about the studies in school have also shown positive effect on achievement of students.

8.8.14 Household tasks

While it seems obvious that reading-related activities are likely to be related to performance, other activities could possibly have a negative impact. Thus, if a student has to spend too much time doing household or family chores, then he or she would have less time for school work.

Variables		Language			Mathematics			EVS		
		Coeff	SE	Sig.	Coeff	SE	Sig.	Coeff	SE	Sig.
Without key variables	Looking family member	0.84	0.39	*	3.10	.47	**	2.28	.43	**
	Prepare food	−0.50	0.32	NS	−1.23	.35	**	−.18	.31	NS
	House cleaning	0.61	0.34	NS	−.47	.38	NS	1.35	.39	**
With key variables	Looking family member	0.88	0.38	*	3.10	.47	**	2.28	.43	**
	Prepare food	−0.29	0.32	NS	−1.23	.35	**	−.18	.31	NS
	House cleaning	0.80	0.34	*	−.47	.38	NS	1.35	.39	**

Table 8.15: Regression results – Students doing household tasks

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Perhaps surprisingly, there is no evidence that the load of domestic tasks is negatively related to attainment, at least at the level encountered here. There is even some evidence that time spent caring for the family and cleaning the home is associated with slightly higher attainment. However, in Mathematics, preparing food hampered achievement of students.

8.9 Conclusion

Students from affluent families and having more educational resources have better chance to outperform at school than their counterparts. Some interesting findings were observed with regard to the educational resources available in schools. It was observed that more number of students were taking private tuitions and getting help in studies from their family members. On a positive note it was found that overall, 90% of students liked their school and tried to do their best.

For analysis, parental education, parental occupation, number of books at home, and possessions at home were combined to form an index of socio-economic status.

The relation between attainment in different subjects and a wide range of factors connected with students' home and background was analysed. It is well known that one cannot make definite causal inferences from a cross-sectional study as one cannot be sure of the direction of causation, nor that both the outcome and the potential cause are not caused by a third variable. Also, much of the information relates to relatively recent time rather than the students' whole experience. However, we carry out comparisons between a factor (such as mode of transport) first on its own and then simultaneously allowing for the key variables, socio-economic status and language spoken at home. If making this allowance gives rise to a substantial difference to the factor's relationship with the outcome, then it is likely that both are a product of socio-economic factors. For example, students from better off families are likely to do better at school and not walk to school. Conversely, if a relation between a factor and an outcome is not extinguished by making such allowances, it is reasonable to suggest that the factor is having an effect on the outcome.

Factors investigated included gender, caste category, number of siblings, being physically challenged, mode of transport to school, and having a subject textbook. All these are related to attainment as might be predicted. Generally the relationship is weakened by allowing for the key variables, but not extinguished, suggesting that the key variables do not entirely explain the connection.

In addition to resources and other home factors, students' attitude to subject is likely to be related to performance. Students who had a positive attitude to learning in different subjects did better than their counterparts. Homework is generally accepted in the profession to improve performance, though evidence from international studies is not clear cut. It is likely that successful students may well do homework, but it is also likely that struggling students may be given extra homework to help them to catch up. Students who get help at home and whose homework is checked at home do better, as do the vast majority whose homework is checked in class by the teacher. Interestingly, the relation with help at home is reduced if not removed after allowing for the key background factors, while that with setting homework and checking it at school is effectively unchanged. Is it only the resources in general that contribute to the effect of homework, or is it only better off families in general who do this? Students who have private tutoring do not do any better, and indeed do worse after allowing for the key variables, suggesting that tutoring is mainly used as a way of helping struggling students than as a means of getting ahead.

Some behaviours could be expected to be associated with better attainment at school, especially if on the face of it they are related to school subjects. Thus, students who read out of school perform better. This difference seems to be observed for any type of reading. It is largest for reading newspapers, but is still significant even where the reading consists of material not strongly associated with learning, such as reading comics or instructions. These relationships are reduced but not removed after allowing for the key variables. Other activities less directly related to school subject show a more mixed picture. Watch television or videos, hanging out with friends, using the internet, discussing with your friends about what you learn in school and telling your family about learning in school are all associated with better performance, both with and without allowing for key variables. Working with computer and playing sports or games are not significantly associated with better performance, and indeed the former is associated with poorer performance after allowing for the key variables. One might expect that having to perform domestic chores would be associated with poorer performance if it took time away from school work. However, this does not seem to be the case: there is even a small positive association with some aspects of household duties.

The following factors appear to have a robust effect on attainment in different subjects, in the sense that the relationship is statistically significant and is not extinguished by allowing for other important variables including home resources and speaking the language of instruction at home:

- Number of siblings (negative)
- Being physically challenged (negative)
- Mode of transport
- Having a subject textbook
- Positive attitude to learning
- Help in studies
- Homework checked at school and at home
- Reading out of school
- Watching TV
- Hanging out with friends
- Discussing school at home
- Working with the computer (negative)
- Using the internet

Chapter 9

School-related Variables

CHAPTER 9 SCHOOL-RELATED VARIABLES

Part I-Profile

The success of schools in delivering quality teaching is clearly something that both federal and provincial governments need to monitor if they are to identify the characteristics of a healthy learning environment which maximises student achievement. This chapter reports the findings of the NAS in terms of the school variables. A questionnaire was used to collect information on 25 variables from school principals. These variables were grouped into four categories:

- *School Background*: This category consists of variables that are indicative of school management, location, basic infrastructure and facilities, and classes for which school is providing education.

- *Home-School Interaction*: Included here are those variables that may be influenced by both home and school factors. These included attitudes of students, teachers and parents to the school.

- *Teaching and Learning Process*: This includes variables that describe aspects of classroom instruction, such as availability of computers and internet facilities, methods of teacher evaluation etc.

- *School Social Climate*: The school social climate consists of factors that are conducive to a safe, organised and productive learning environment. Included are school discipline problems, such as absenteeism and more serious misbehaviour.

9.1 School Background

The school background variables were:

- School management
- Location
- Resources available in the school
- Inadequacies in the school affecting educational interaction

9.1.1 School management

Of the schools surveyed, approximately 70% were managed by the state government and the schools managed by the Tribal Social Department constituted only 1% of the sample. The rest of the schools were almost equally distributed amongst zila parishad, local body and private aided.

Figure 9.1: School by management type
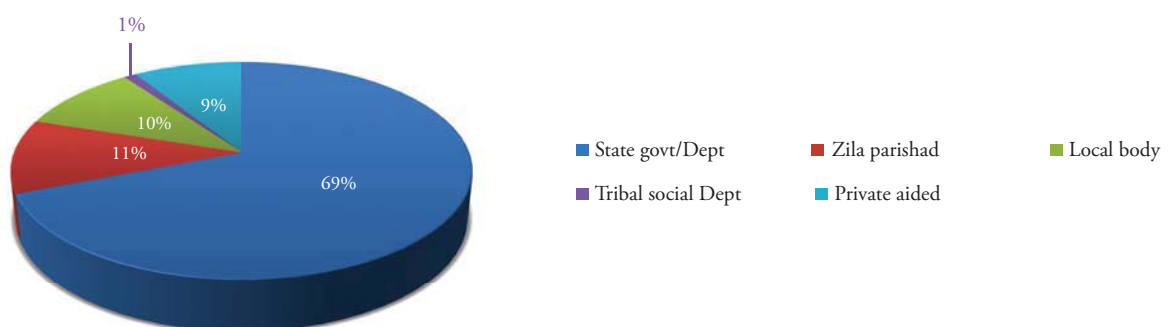
9.1.2 School location

Of the schools surveyed, one-fifth were urban and the rest rural.

Figure 9.2: Location of school
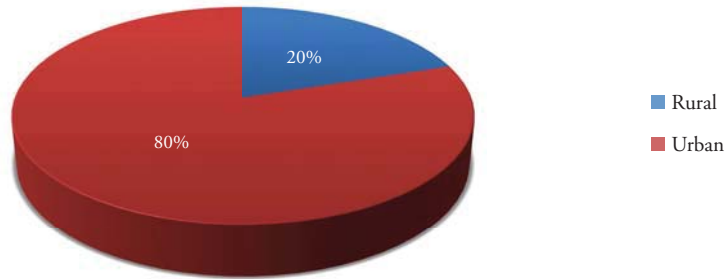
9.1.3 Facilities available in the school

The data regarding the availability of the following facilities in the school was collected. These were categorised into three groups:

- *Physical facilities*: Electricity connection, safe drinking water, water pitchers, mats and furniture, dustbins, playground facilities, toilets, separate toilets for girls, pucca buildings.

- *Teaching and learning materials*: Mini toolkit, mathematics and science kit, globe, books for library/reference books/encyclopedia/children's books, newspaper/ magazines/journals, blackboard, television, computers.

- *Ancillary facilities*: Games equipment, play material, musical instruments, first-aid, annual medical inspection, immunisations.

Figure 9.3 shows that the basic physical facilities are available in a substantial majority of the schools sampled. Approximately two-thirds of the schools have playground facilities, three quarters have separate toilets for girls and 85% have safe drinking water.

Figure 9.3: Physical facilities
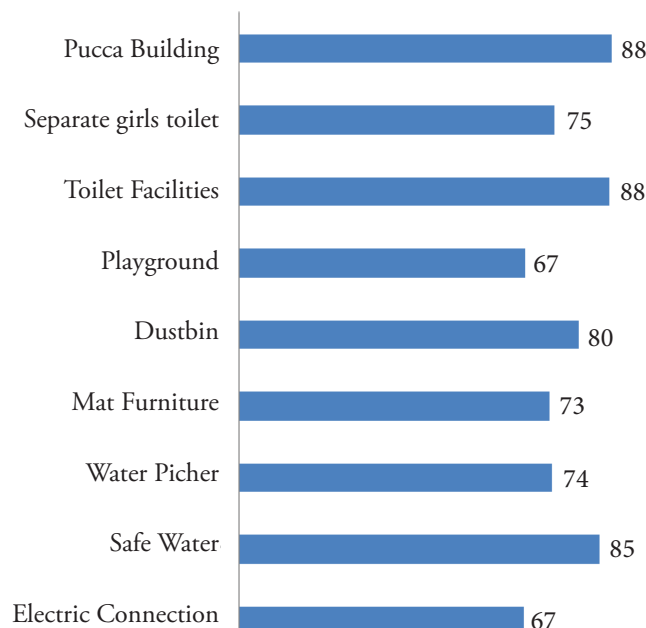
Figure 9.4 shows the availability of teaching and learning materials in the schools sampled. Mathematics kit, globe, books for library, and children's books are available in more than 70% of the schools sampled. Although under the SSA programme, state governments have put in place reforms to improve the delivery of computer systems in schools, computers are still available in fewer than half of the schools sampled.

Figure 9.4: Teaching and learning materials

Material	Value
Computer	45
Television	35
Blackboard	96
Magazines	50
Children's book	86
Encyclopedia	39
Reference book	81
Globe	92
Science kit	56
Maths kit	74
Mini tool kit	56
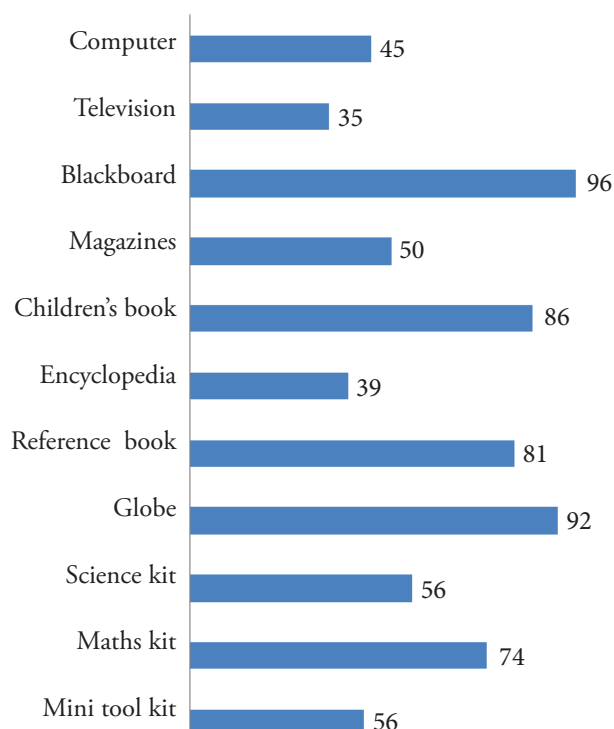
Under SSA, health registers are to be maintained in all the schools. The nodal officer is identified and nominated by the Department of School Education for each school for health checkups. Of the ancillary facilities available, in over 70% of the schools, a medical checkup is carried out. Games equipment is available in 75% of the schools sampled whereas musical instruments are available in only 41% of the schools (Figure 9.5).

Figure 9.5: Analysis facilities

Facility	Value
Musical Instrument	41
Medical check-up	73
immunization facility	68
First aid	53
Games Equipment	75
Play material	77
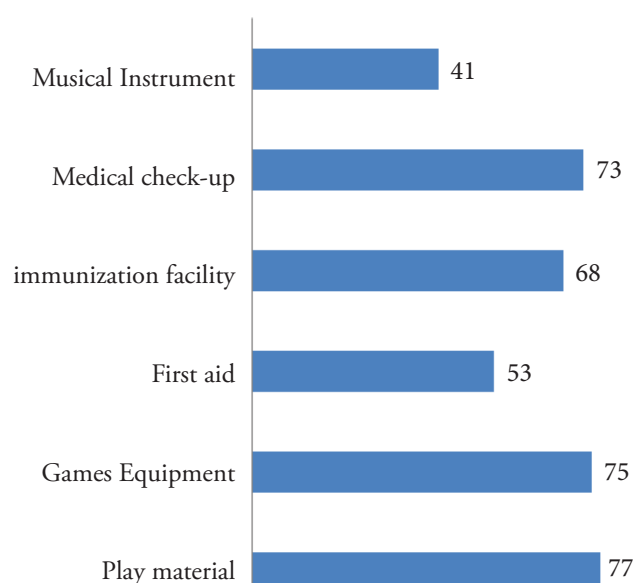
9.1.4 Shortages and inadequacies in school affecting educational interaction

The extent to which schools felt that shortages or inadequacies in schools affected their ability to provide instruction was stratified into four grades: none, a little, some, and a lot. The necessities were as follows:

- Instructional materials
- Budgets for supplies
- School buildings and grounds
- Heating/Cooling and lighting system
- Instructional space
- Special equipment for handicapped pupils

Of the schools sampled, fewer than 20% felt that shortages or inadequacies in instructional materials, budget for suppliers, school buildings and grounds, heating/cooling and lighting systems, instructional space, and special equipment for challenged students did have a lot of effect on the school's capacity to provide instruction. Also, over one-third of the schools sampled did not feel that the shortage of the above had any effect on the school's capacity to provide instruction and 62% of the schools sampled did not feel that their capacity to provide instruction was affected by shortage of special equipment for challenged students (Figure 9.6).

Figure 9.6: Shortages and inadequacies affecting teaching capacity
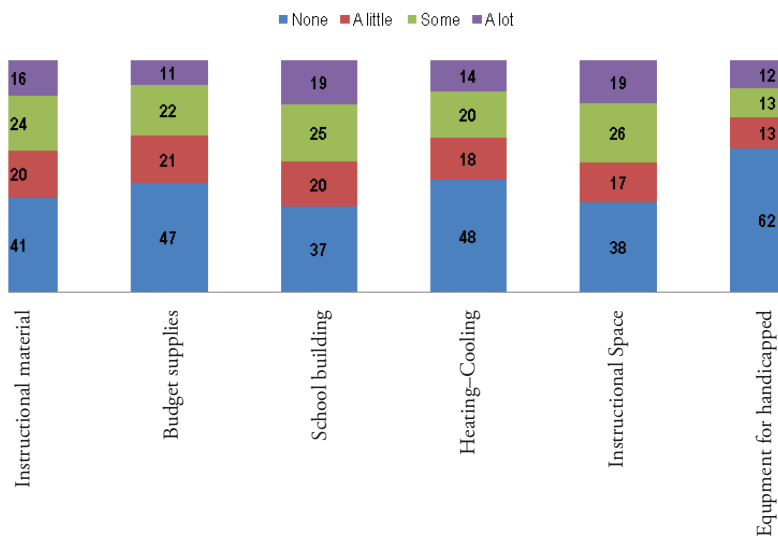
9.2 Home–School Interaction

The involvement of parents in various activities of the schools like attending special events, raising funds, ensuring that the child completes homework, membership of school committees etc. contributes to a healthy learning atmosphere as well as to effective home–school interaction. The home–school interaction category represents those variables which are jointly influenced by both home and school factors. The aspects surveyed in this were attitudes of students, teachers and parents towards the school and the process of educational transaction.

9.2.1 Factors related to attitudes of students, teachers and parents towards the school

The attitudes of the primary stakeholders, i.e., students, teachers and parents, to education in general and their child's school in particular, are extremely important factors affecting the teaching and learning process. This study

has collected information on the following factors: teachers' job satisfaction, teachers' understanding of curricular goals, teachers' degree of success in implementing the curriculum, teachers' expectations of students' achievement, parental support for students' achievement, parental involvement in school activities, students' regard for school property, and students' desire to do well in school. All the above factors were collected in five levels—very high, high, medium, low and very low. Overall, the majority of responses are in the high and medium zones. More than 50% of the schools reported teachers' job satisfaction, teachers' understanding of the curricular goals, teachers' degree of success in implementing the curricula and teachers' expectation of student achievement as high (Figure 9.7). Approximately 40% of the schools reported parental support for students' achievement, parental involvement in school activities, and students' regard for school property as medium. Over 60% of the schools rated students' desire to do well in school as high.

Figure 9.7: Attitudes to school
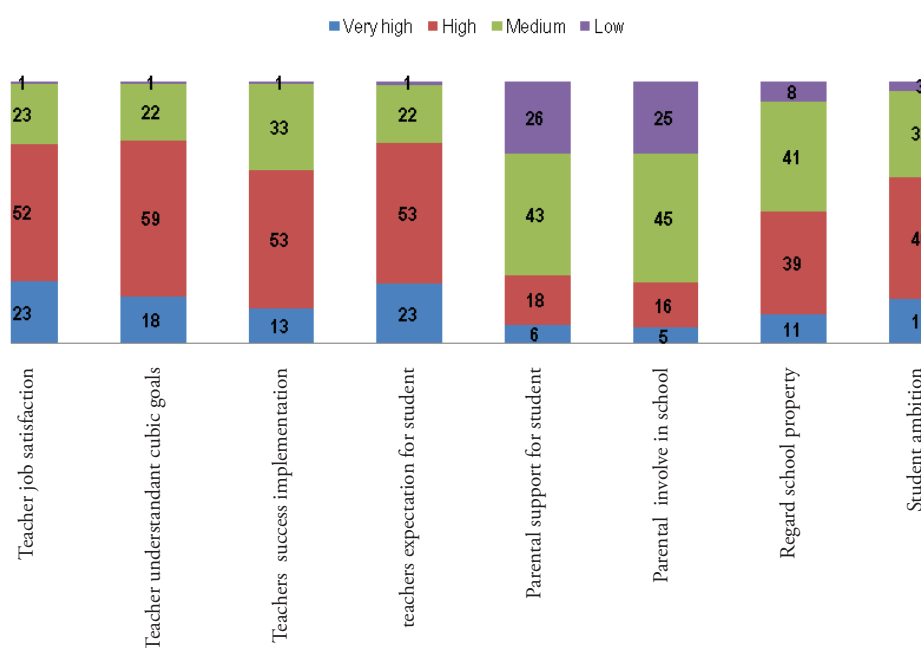
9.3 Teaching and Learning Process

Teaching and learning is a process that includes many variables. These variables interact as learners work towards their goals and incorporate new knowledge, behaviours and skills that add to their learning experiences. The present survey included the following variables:

- Availability of instructional materials

- Availability of computers and internet facilities

- Availability of assistants to teachers in using information and communication technology (ICT)

- Methods of teacher evaluation

9.3.1 Instructional materials

The availability of instructional materials in the form of textbooks, workbooks, teacher handbooks, and Teaching Learning Material (TLM) contributes to effective classroom interaction and provides invaluable help in ensuring quality and uniformity in teaching and learning process. It was found that 90% of the schools had textbooks in EVS, Mathematics and Language, 57% had workbooks in all the three subjects, a teachers' handbook was available in 70% of the schools and TLM was available in more than 80% of the schools sampled.

Figure 9.8: Availability of instructional materials
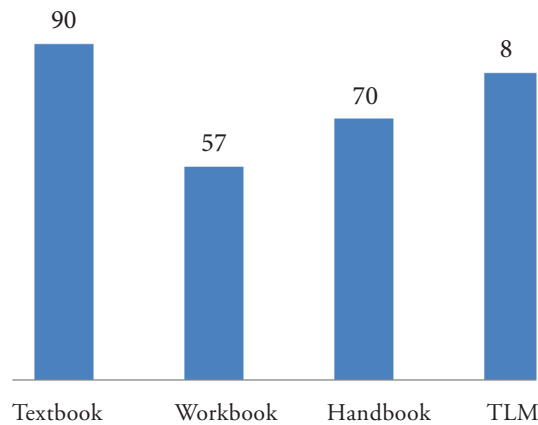
9.3.2 Availability of computers, internet facilities and assistance to teachers in using ICT

The survey asked for the number of computers in the school for educational purposes, access to internet facilities for educational purposes and availability of help to teachers to use ICT for teaching and learning. The average number of computers per school was 1.59 in the participated schools; 85% of the schools sampled did not have access to the internet (Figure 9.9); and around 72% of the schools did not have ICT facilities (Figure 9.10).

Figure 9.9: Internet access
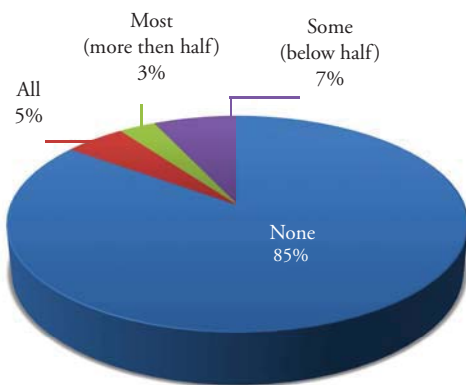
Figure 9.10: ICT facilities
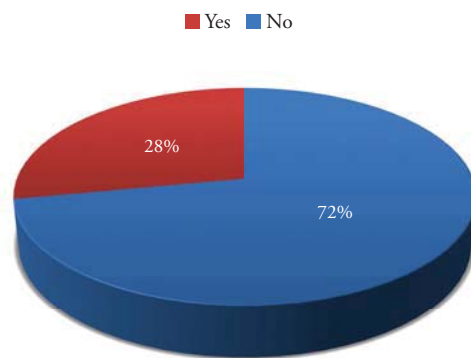
9.3.3 Methods of teacher evaluation

The study carried out teacher evaluation in the schools by the following methods:

- Observations by the principal
- Observations by inspectors
- Students' achievements
- Teacher peer review

Each of these types of evaluation is used in most schools. As shown in Figure 9.11, the schools reported that 92% used observations by the principal, 77% observations by inspectors, 94% students' achievement and 82% teacher peer review.

Figure 9.11: Methods of teacher evaluation

Observation principal — 92
Observator inspector — 77
Student achieves — 94
Teacher peer review — 82
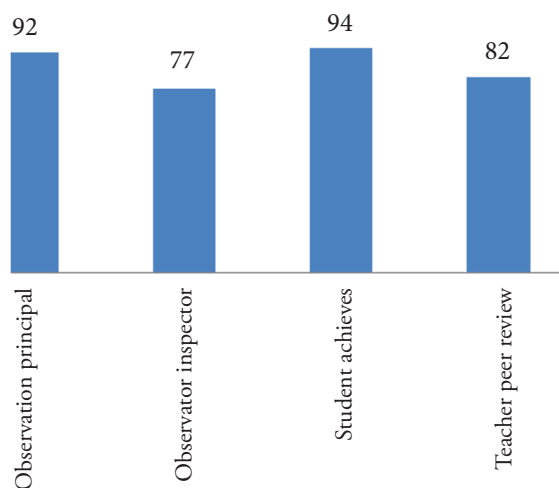
9.4 School Social Climate

The school climate is concerned with the psychological context in which school behaviour is rooted. School climate is considered to be a relatively enduring quality of the school that is experienced by the teachers and students and which in turn influences their behaviour. The school social climate category here consisted of problem behaviours amongst students.

9.4.1 Problem behaviours amongst students

Behavioural problem areas of the students were graded into five frequencies of occurrences of such behaviour—never, rarely, monthly, weekly and daily. The major areas probed were:

■ Late arrival to school

■ Absenteeism

■ Skipping classes

■ Non-adherence to the school dress code

■ Disturbing the classroom decorum

■ Indulgence in cheating

■ Using profanity

■ Indulgence in vandalism

■ Activities of theft

■ Intimidation/Verbal abuse to other students

■ Causing physical injuries to others students

■ Intimidation/Verbal abuse to teachers

■ Causing physical injuries to teachers

Fortunately, such aberrant behaviour was rarely seen in most of the schools sampled

(Table 9.1). Nearly 90% of the schools never or rarely saw late arrival to school. Absenteeism was rare in 59% of the schools. In 53% of the schools, skipping classes by students was never observed. Non-adherence to the school dress code was never observed in 45% schools. Disturbing the classroom decorum was never observed in 53% of the schools. 64% of the schools never observed student indulgence in cheating. 68% of the schools never observed students using profanity. Indulgence in vandalism was never observed in 71% of the schools. Activities of theft were never observed in 77% of the schools. Intimidation/Verbal abuse to other students was never observed in 54% of the schools. Causing physical injuries to other students was never observed in 60% of the schools. Intimidation/ Verbal abuse to teachers was never observed in 88% of the schools, and causing physical injuries to teachers was never observed in 94% of the schools.

Table 9.1: Problem behaviours amongst students					
	Never	**Rarely**	**Monthly**	**Weekly**	**Daily**
Arriving late at school	23%	66%	5%	5%	2%
Absenteeism	19%	59%	10%	9%	3%
Skipping class	53%	33%	4%	7%	3%
Violating dress code	45%	42%	3%	5%	5%
Classroom disturbance	53%	40%	2%	2%	3%
Cheating	64%	32%	1%	1%	1%
Profanity	68%	30%	1%	1%	1%
Vandalism	71%	26%	2%	1%	1%
Theft	77%	21%	1%		
Intimidation/Verbal abuse of other students	54%	41%	2%	1%	1%
Physical injury to other students	60%	37%	2%	1%	
Intimidation/Verbal abuse of teachers/staff	88%	10%	1%		1%
Physical injury to other teachers	94%	6%			

Part II-School Factors and Student Attainment

In the previous chapter, we looked at the relation between home background and attainment in different subjects, and found it substantial in many ways. However, no matter how strong the relation is, the relation with school characteristics has to be central since with all due acknowledgment of home tutoring and homework, essentially, school is where academic learning takes place.

Because this is a cross-sectional study, it is of course not possible unambiguously to assign causality to possible contributory factors. In particular, many of the possible factors are likely to be related to social resources available to the students. To attempt to take some account of this, in chapter 8 we considered the relation between outcomes and factors investigated, first on their own and then allowing for socio-economic background and language spoken: these are described as key variables. In this chapter, we follow the same approach, first consider the relationship on its own, and then after allowing for key variables. If a relation between a factor and an outcome is not extinguished by making such allowances, it is reasonable to suggest that the factor is having an effect on the outcome.

9.5   Treatment given to Variables used in Analysis

School-related variables were treated in the following manner:

Variables	Categories of Variables	Treatment
	Table 9.2: School-related variables and its treatment for regression analysis	
School management	**a)** State Government/Department of Education, **b)** Zila Parishad, **c)** Local body, **d)** Tribal social department, **e)** Private aided	'STATE GOVERNMENT/DEPARTMENT OF EDUCATION' as a base category
Attachment of pre school	**a)** Yes, **b)** No	'NO' as a base category
Students' background	**a)** Economically disadvantaged homes, **b)** Middle income homes, **c)** Economically affluent homes	Three dichotomous variables were created to indicate schools with more than 50 per cent of pupils from each of the three categories.
Infrastructural facilities	**a)** Games equipment, **b)** Play material and toys, **c)** Mini toolkit, **d)** Mathematics kit, **e)** Science kit, **f)** Globe, **g)** Books for library, **h)** Musical instruments, **i)** Notice board, **j)** Blackboard, **k)** Television, **l)** Computer, **m)** Electric connection, **n)** First aid, **o)** Medical checkup, **p)** Immunisation facility, **q)** Safe drinking water, **r)** Water pitcher, **s)** Mats and furniture, **t)** Dustbin, **u)** Playground facilities, **v)** Toilet facilities, **w)** Separate toilets for girls, **x)** Pucca building	A scale was created by summing the number of 'YES' responses
Instructional materials	**a)** Textbooks, **b)** Workbooks, **c)** Teacher Handbooks, **d)** Teaching and learning material	A scale was created by summing the number of 'YES' responses
School perception	**a)** Teacher's job satisfaction, **b)** Teacher's understanding, **c)** Teacher's degree, **d)** Teacher's expectation, **e)** Parental support, **f)** Parental involvement, **g)** Students' regard for school property, **f)** Students' desire to do well in school	Responses were coded from very high to very low
Evaluation of practice of teachers	**a)** Observations by the principal, **b)** Observations by the inspectors, **c)** Students' achievement, **d)** Teacher peer review	'NO' as a base category
Behaviour problems	**a)** Arriving late at school, **b)** Absenteeism, **c)** Skipping class, **d)** Violating dress code, **e)** Classroom disturbance, **f)** Cheating, **g)** Profanity, **h)** Vandalism, **i)** Theft, **j)** Verbal abuse of other students, **k)** Physical injury to other students, **l)** Verbal abuse of teachers, **m)** Physical injury to teachers	Treated as quasi-continuous variables
Inadequacy of facilities	**a)** Instructional materials, **b)** Budget for supplies, **c)** School building and grounds **d)** Heating/Cooling and lighting, **e)** Instructional space, **f)** Equipment for handicapped students, **g)** Computers for Math instruction, **h)** Computer software for Mathematics, **i)** Library materials, **j)** Audio-visual resources, **k)** Science laboratory, **l)** Computer for EVS, **m)** Computer software for EVS, **n)** Library materials to EVS instruments, **o)** Audio-visual resources, **p)** Teachers, **q)** Computer support staff	A scale was created of the number of resource problems.
Student computer ratio	Ratio of number of pupils to number of computers was calculated	
Access to internet	**a)** All, **b)** Most, **c)** Most, **d)** None	'NONE' as a base category
Use of ICT	**a)** Yes, **b)** No	'NO' as a base category

As in the previous chapter in the regressions described here, one category, usually the largest, is designated as a 'base' category and assigned a zero value, and all other categories were defined in terms of their difference from the base result.

Since students were the basis for sampling, the student remains the unit of analysis, regardless of the source of information from the questionnaires. That is, the results shown in the tables in this chapter are the percentages of

students whose school principals reported on a particular activity or characteristic and who completed a test on the relevant subject, in this case Language. Typically, because of the matrix sampling scheme which means that no students were tested in all the subjects, this is of the order of two-thirds of the number with questionnaire responses. When a teacher or principal did not complete the assigned questionnaire, background data was not available for those students.

9.6 School Facilities and Resources

Under this, the information regarding games equipment, play material and toys, mini toolkit, globe etc. were collected from school. These facilities were treated as infrastructural facilities available in the school. Further, information was gathered regarding inadequacy or shortage of facilities such as instructional materials, school buildings and grounds, heating/cooling and lighting systems, instructional space (e.g., classroom**s)**, special equipment for handicapped students etc. Besides, information about availability of computer, access to internet and assistance to use ICT to teachers for teaching and learning process was also sought.

Possessing a resource does not mean that it is used wisely, or even at all, and it could be that some resources are less relevant in this day and age with the wide availability of information from the internet. Another way of looking at the same question is to ask whether school's capacity to provide instruction is affected by a shortage or inadequacy of resources. The answer to this could be none, a little, some or a lot.

9.6.1 Infrastructural facilities

Table 9.3: Regression results – Schools facilities								
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	0.77	0.12	**	.30	.15	*	.27	.13	*
With key variables	0.56	0.11	**	.21	.15	NS	.15	.13	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Pupils in schools with more infrastructural facilities performed significantly better as compared to the pupils in schools with fewer facilities in all the three subjects.

9.6.2 ICT facility

Of particular contemporary interest is access to computer facilities. Schools were asked about internet access, the number of students per computer and whether the school had communication technology help.

9.6.2.1 Student–Computer ratio

Table 9.4 : Regression results – Student–Computer ratio								
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	0.95	0.30	**	.47	.23	*	.77	.23	**
With key variables	0.90	0.31	**	.42	.23	NS	.72	.23	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Pupils in schools with a higher ratio of computers performed better than the pupils in schools with a lower ratio of computers in Language, Mathematics and EVS.

9.6.2.2 Access to internet

Table 9.5: Regression results – Access to internet									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	−.94	−.95	NS	−4.10	.94	**	−4.35	.77	**
With key variables	−1.87	.93	*	−4.34	.93	**	−4.72	.76	**

*Significant if P<.05 , **Significant if P<.01, NS–Not Significant

Access to internet has shown negative effect on achievement of students in different subjects.

9.6.2.3 Use of ICT

Table 9.6: Regression results – Use of ICT									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	6.14	1.46	**	−1.67	1.73	NS	2.92	1.16	*
With key variables	3.96	1.43	**	−2.30	1.74	NS	1.95	1.18	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Availability of help to the teachers to use ICT for teaching and learning had positive impact on achievement in Language and EVS.

As far as students in schools with internet access are concerned, the majority did worse than those without. However, students in schools with communication technology help performed better than students in schools without.

9.7 School Governance

Another important aspect of a school's function is its context, including its governance and composition.

9.7.1 School management-wise

Table 9.7: Regression results – School management										
Variables		**Language**			**Mathematics**			**EVS**		
		Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	Zila Parishad	8.9	2.13	**	11.35	2.26	**	8.87	2.03	**
	Local Body/Mun. Com.	9.17	2.22	**	8.09	2.19	**	9.30	2.07	**
	Tribal Social Dept.	−12.82	7.53	NS	−.78	9.77	NS	−15.17	12.29	NS
	Private aided	17.26	1.86	**	6.88	1.79	**	11.11	2.04	**

With key variables	Zila Parishad	9.28	2.17	**	11.12	2.30	**	8.62	2.01	**
	Local Body/Mun. Com.	7.61	2.13	**	7.31	2.20	**	8.29	2.10	**
	Tribal Social Dept.	−7.1	7.47	NS	.27	9.63	NS	−12.33	12.33	NS
	Private aided	13.09	1.79	**	5.79	1.78	**	9.72	2.07	**

*Significant if P<.05, **Significant if P<.01, NS−Not Significant

Nearly two-thirds of the sample attended schools managed by the state government/department of education, 1% in tribal and approximately 10% in each of the other categories. Students in private aided schools, zila parishad and local body/municipal committee/urban local body perform better, and while this is slightly reduced in local body schools by allowing for key variables, the difference is still substantial. By contrast, though the pupils in the tribal schools showed a poor performance but the results were not significant statistically.

9.7.2 Attachment of pre-school

Table 9.8: Regression results − Pre-school attached									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	1.35	0.66	**	−4.80	1.31	**	−5.76	1.57	**
With key variables	1.34	0.34	**	−5.00	1.33	**	−6.01	1.56	**

*Significant if P<.05 , **Significant if P<.01, NS−Not Significant

It is known that students with experience of pre-school are likely to perform better than those without any comparable experience. There is no information about the length of pre-school experience of the sample, but students who attend a school with a pre-school attached do worse.

9.8 Compositional and Contextual Factors

Value-added investigations of school performance have shown that the main factor in determining the attainment of a school's graduates is the characteristics of the intake.

Table 9.9 presents the characteristics of the sample, and shows the relation between average characteristics of the pupils and performance in different subjects.

9.8.1 Students' background

Table 9.9: Regression results − Students' background									
Variables		**Language**			**Mathematics**			**EVS**		
		Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	Economically disadvantaged	−4.02	1.32	**	−1.53	1.15	NS	−1.39	1.33	NS
	Middle Income	5.77	1.93	**	3.88	2.09	NS	4.21	1.93	*
	Economically affluent	1.47	3.82	NS	.14	3.32	NS	−5.09	3.44	NS

*Significant if P<.05, **Significant if P<.01, NS−Not Significant

Difference in the achievement of pupils in schools with more than 50% from disadvantaged backgrounds, pupils in schools with more than 50% from middle income backgrounds and pupils in schools with more than 50% from affluent backgrounds was not statistically significant in Mathematics. In Language, pupils in schools with more than 50% from middle income group have shown significantly better performance while pupils in schools with more than 50% from economically disadvantaged group have shown poor performance. However, in EVS, pupils in schools with more than 50% from middle income group were found to have significant positive effect on their achievement.

9.8.2 Instructional materials

Table 9.10: Regression results – Instructional materials								
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	−5.06	4.94	NS	.95	4.39	NS	.13	2.41	NS
With key variables	−5.27	4.71	NS	.13	4.30	NS	−.16	2.43	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Availability of instructional materials like textbooks, workbooks, teacher's handbooks and TLM has not shown any positive effect on achievement of students.

9.8.3 School perception

Table 9.11: Regression results – School perception									
Variables		**Language**			**Mathematics**			**EVS**		
		Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	Teachers' job satisfaction	−0.71	0.86	NS	3.90	.86	**	1.39	.95	NS
	Teachers' understanding	−0.45	0.81	NS	4.96	1.01	**	.73	.96	NS
	Teachers' degree of success	1.14	0.84	NS	4.90	.94	**	2.55	1.00	*
	Teachers' expectations	0.49	0.84	NS	2.64	.88	**	1.65	.79	*
	Parental support	2.66	0.67	**	2.13	.67	**	2.61	.61	**
	Parental involvement	2.21	0.63	**	2.49	.73	**	2.49	.70	**
	Students' regard for school property	1.30	0.66	*	3.35	.80	**	1.71	.87	*
	Students' desire to do well	0.81	0.68	NS	2.67	.86	**	.58	.88	NS
With key variables	Teachers' job satisfaction	−0.55	0.85	NS	3.83	.84	**	1.47	.96	NS
	Teachers' understanding	−0.39	0.78	NS	4.88	1.00	**	.80	.95	NS
	Teachers' degree of success	0.97	0.82	NS	4.65	.93	**	2.37	.98	*
	Teachers' expectations	0.47	0.82	NS	2.60	.87	**	1.62	.79	*
	Parental support	2.01	0.67	**	1.84	.67	**	2.27	.62	**
	Parental involvement	1.71	0.64	**	2.21	.74	**	2.20	.72	**
	Students' regard for school property	1.31	0.67	NS	3.31	.80	**	1.79	.87	*
	Students' desire to do well	0.82	0.69	NS	2.60	.85	**	.57	.88	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

A range of school-related variables as assessed by the principals were considered. Parental support, parental involvement and students' regard for school property were found to be positively associated with pupil attainment

in all the subjects. Further, teachers' degree of success in implementing curriculum and teachers' expectations for student achievement have significant positive effect on Mathematics and EVS achievement. Besides this, teachers' job satisfaction and students' desire to do well were found to have positive influence on Mathematics achievement scores.

9.8.4 Behaviour problems

Table 9.12: Regression results – Behaviour problem of students									
Variables	**Language**			**Mathematics**			**EVS**		
	Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	−0.37	0.12	**	−.45	.13	**	−.45	.11	**
With key variables	−0.36	0.12	**	−.44	.13	**	−.46	.11	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Pupils in schools where the pupils as a whole exhibit more anti-social behaviour performed relatively poorly in all three subjects.

9.9 Accountability-related procedures

It is widely considered that some form of assessment or accountability is an important aspect of educational progress. Thus, for example, while considering giving homework in chapter 8, it was observed that it was not sufficient just to give homework: the pupils who performed well attended schools where the homework was marked in school. We next consider the information the study provides on assessment and accountability.

Teachers too can be assessed. Table 9.13 shows four possible methods of assessing a teacher's competence.

9.9.1 Evaluation of practice of teachers

Table 9.13: Regression results – Evaluation of classroom teaching										
Variables		**Language**			**Mathematics**			**EVS**		
		Coeff	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**	**Coeff**	**SE**	**Sig.**
Without key variables	Observation by principal	2.02	2.2	NS	3.38	2.75	NS	3.47	2.75	NS
	Observation by inspectors	2.17	1.39	NS	5.64	1.44	**	4.39	1.34	**
	Student achievement	−3.06	3.15	NS	3.06	3.77	NS	2.48	3.08	NS
	Teacher peer review	6.8	1.85	**	6.47	1.96	**	7.23	1.89	**
With key variables	Observation by principal	0.78	2.18	NS	3.08	2.73	NS	3.00	2.70	NS
	Observation by inspectors	3.13	1.33	**	5.86	1.49	**	4.88	1.33	**
	Student achievement	−2.52	3.01	NS	3.30	3.71	NS	2.82	3.05	NS
	Teacher peer review	6.54	1.75	**	6.16	1.96	**	6.86	1.89	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

According to principals, all four methods are used by 80% of schools. Interestingly, peer review and observation by inspectors were associated with higher attainment.

9.10 Conclusion

Students from better equipped schools have performed better than the students studying in less equipped schools. With regard to availability of physical facilities in schools, a large variation was seen. For example, whereas the blackboard, globe, children's books etc. were available in more than 85% of schools, computer, television, mini toolkit etc. were available in less than 45% schools. While pucca building, safe drinking water and toilet facilities were available in more than 85% schools, necessary facilities like playground and electric connection were available only in 67% schools. On a positive note, over 90% schools reported that they asked the parents to get involved in their child's learning process and over 60% schools reported that their students desired to do well in studies.

This chapter has also considered the relationship between student attainment and school factors as gathered by a questionnaire from head teachers/school principals. It goes without saying that it is the place where the majority of transmission of academic knowledge takes place. Nevertheless, home influences are paramount in the progress of learning: some students learn more quickly than others, and very often this can be linked to home background. To take some account of this, the relation between school factors and student attainment is presented in two ways, first on its own, and then after allowing for key home factors, socio-economic status, and speaking the language of instruction at home.

Schools were asked whether they possessed a wide range of resources for education. It was found that students in schools which possessed nearly all the possible resources performed well. Allowing for home key variables did not remove the better performance of the best-equipped schools. There is little point in having resources if they are not used; perhaps a more important indicator is whether a school feels that a lack of resources is inhibiting it. Nearly half of the students were in schools where principals had quite a high perception of being inhibited in this way, yet there was no significant difference in performance of their students.

Computing resources are an increasingly important aspect of school facilities, but findings are somewhat mixed. Pupils in schools with higher ratio of computers performed better than those with low ratio of computers. Pupils in schools with internet access do worse than those without. Students in schools with communication technology help perform better than schools without communication technology.

Another important aspect of a school's function is its context, including its governance and composition. Principals were asked which of these bodies managed their school. State schools (the majori**ty)** did worse than schools under different types of management, except those which were under the tribal social department. Pupils in schools where 50% of pupils are from middle income families do better, while pupils in schools where 50% of pupils are from disadvantaged families do worse.

School ethos and atmosphere is generally considered to be essential in promoting pupils attainment. Pupils in schools in which parents are asked to take part in a range of activities do better than those in less inclusive schools. This difference largely disappears after allowing for student key variables. Pupils in schools where the principal considers that parents have a high degree of involvement in school activities do better, but parental support for pupil attainment is not significantly related. Parental involvement and inputs are generally only indirect factors - though obviously very important ones - in the more important ones of pupils attitude towards school. Pupils in schools where the principal considers that they have a high desire to do well are likely to attain (slightl**y)** better, and this difference is little affected by allowing for background key variables. Having a high regard for school property is significantly related to attainment.

Principals were asked about problem behaviour in the school. It was found that the majority did not have frequent problem behaviour in their school, but where there was any frequent problem behaviour, pupil attainment was lower.

It is arguable that some form of assessment or accountability is an important aspect of educational progress. It is not just students who can be assessed: principals were asked whether teachers were assessed by observations by the principal or senior staff; observations by inspectors or other persons external to the school; student achievement; or teacher peer review. Only teacher peer review and observation by inspectors were associated with better performance by pupils to any great extent.

The following factors appear to have a robust effect on attainment in different subjects, in the sense that the relationship is statistically significant and are not extinguished by allowing for other important variables including home resources and speaking the language of instruction at home:

- Equipment
- School governance
- Pre-school attached (negative)
- Student–Computer ratio
- Internet access (negative)
- Help in communication technology
- Middle income
- Disadvantaged pupils (negative)
- School involves parents
- Pupils desire to do well
- Problem behaviour (negative)
- Teacher peer review.

It is interesting to note that the differences relating to school factors are considerably smaller than those relating to student factors.

Chapter 10

Teacher-related Variables

CHAPTER 10 TEACHER-RELATED VARIABLES

Part I-Profile

Teachers are a vital component of the educational process and it is therefore important to know the characteristics of teachers, the strategies they use in the classroom, and their general attitudes towards teaching in schools. This chapter provides information about some of the important characteristics of the class V teachers in the survey, categorised into four headings: teacher background, teacher training, teaching learning process, and teachers' opinion about their school. The teachers who taught the sampled students in the subjects tested were asked to complete a Teachers' Questionnaire. A total of 10,851 teachers responded as shown in Table 10.1.

S.No.	State/UT	Number responding	S.No.	State/UT	Number responding
1.	Andhra Pradesh	318	17.	Mizoram	520
2.	Assam	590	18.	Nagaland	295
3.	Bihar	420	19.	Orissa	416
4.	Chhattisgarh	257	20.	Punjab	261
5.	Delhi	148	21.	Rajasthan	290
6.	Goa	105	22.	Sikkim	263
7.	Gujarat	362	23.	Tamil Nadu	324
8.	Haryana	241	24.	Tripura	392
9.	Himachal Pradesh	329	25.	Uttar Pradesh	326
10.	Jammu & Kashmir	651	26.	Uttarakhand	463
11.	Jharkhand	622	27.	West Bengal	561
12.	Karnataka	406	28.	A & N Islands	257
13.	Kerala	365	29.	Chandigarh	113
14.	Madhya Pradesh	324	30.	Puducherry	171
15.	Maharashtra	480	31.	Daman & Diu	102
16.	Meghalaya	479		Total	10851

Table 10.1: Teachers included in survey

10.1 Teachers' Background

The questionnaire collected information on a wide range of background factors as set out in the paragraphs that follow. This chapter summarises findings for all teachers in the sample.

10.1.1 Gender

Of the teachers from class V who took part in this survey, half were female and half male.

Figure 10.1: Male and Female Teachers
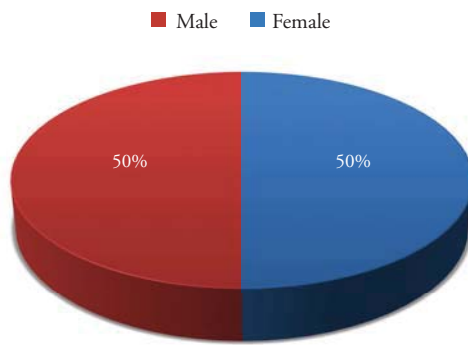
10.1.2 Age

The age profile of the teachers completing the survey questionnaire is given in Figure 10.2. In our sample, 23% of teachers were below the age of 30, whilst about 13% were above 50 years of age.

Figure 10.2: Age of teachers
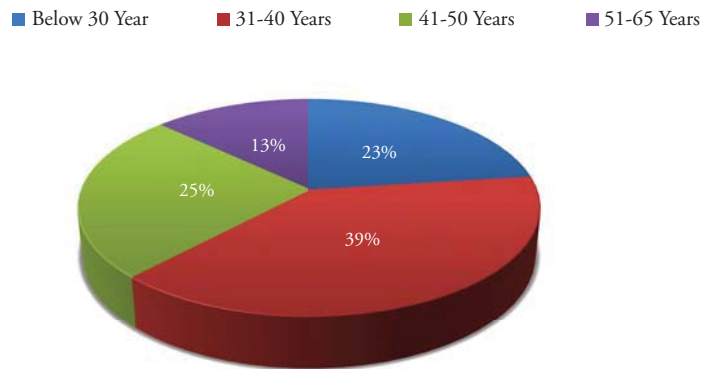
10.1.3 Educational qualification

The survey asked primary school teachers about their highest educational qualification. The results showed that overall, 64% of the teachers in the sample were graduates or post graduates, 24% were qualified at higher secondary level, and 10% of teachers were qualified at secondary level.

Figure 10.3: Educational qualifications of teachers
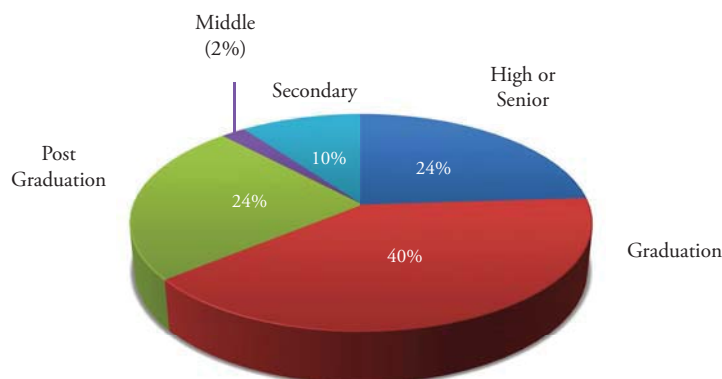
10.1.4 Teachers' employment status

In India, states differ from one another on policies and requirements for appointing teachers. Under SSA and the Right to Education Act (2009), enrolment in schools up to upper primary classes has substantially increased. The Government of India and state governments are making efforts to provide basic infrastructure to all schools to meet the immediate demand. Many states have appointed para teachers, shiksha karmi and part-time teachers to meet this demand. The employment status of teachers is presented in Figure 10.4.

Figure 10.4: Employment states of teachers

Temporary (6%)
Against leave (1%)
Para teacher (11%)
Other (3%)
Regular full time 79%
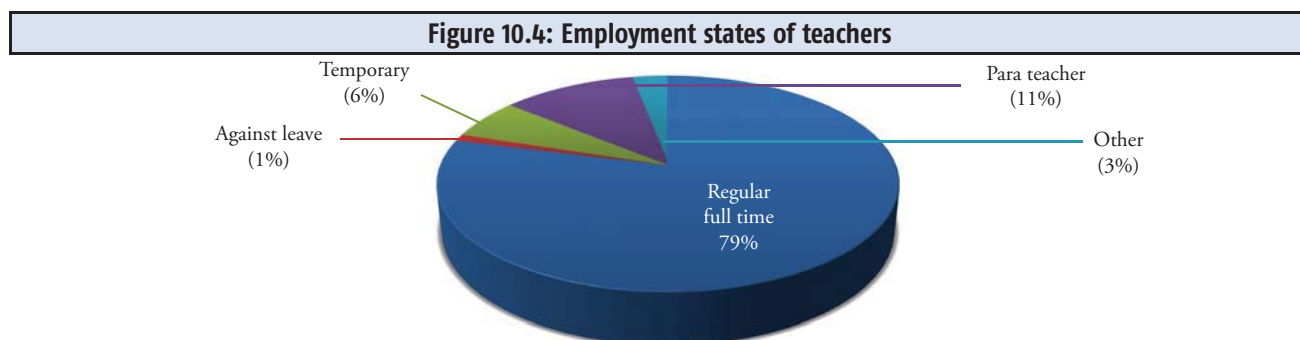
Figure 10.4 shows that the majority of teachers, (nearly four-fifths), were regular or full time teachers, whereas around 1% were working against leave vacancies and 11% were para teachers. The para teachers were appointed by some states to meet the immediate demand of teachers in schools.

10.2 Teacher Training

To ensure high quality education in schools, it is necessary that teachers should be trained. There are two types of teacher training programmes, namely pre-service training and in-service training, prevalent in our education system. The basic pre-service qualification necessary to be appointed as a teacher in a school is a certificate level/diploma or degree programme, e.g. JBT, B.Ed., M.Ed. etc. In-service training is provided for further development of those teachers who are teaching in schools.

10.2.1 Professional qualification

In India, a professional qualification is essential for getting a regular/permanent job in government and government aided schools. A professional qualification helps teachers to understand various methods of teaching, school environment and psychological aspects of the students' personality. The distribution of the professional qualifications of teachers is presented in Figure 10.5.

Figure 10.5: Professional qualification of teachers

Graduate Training
MEd and others (2%)
34%
64%
Primary or elementary
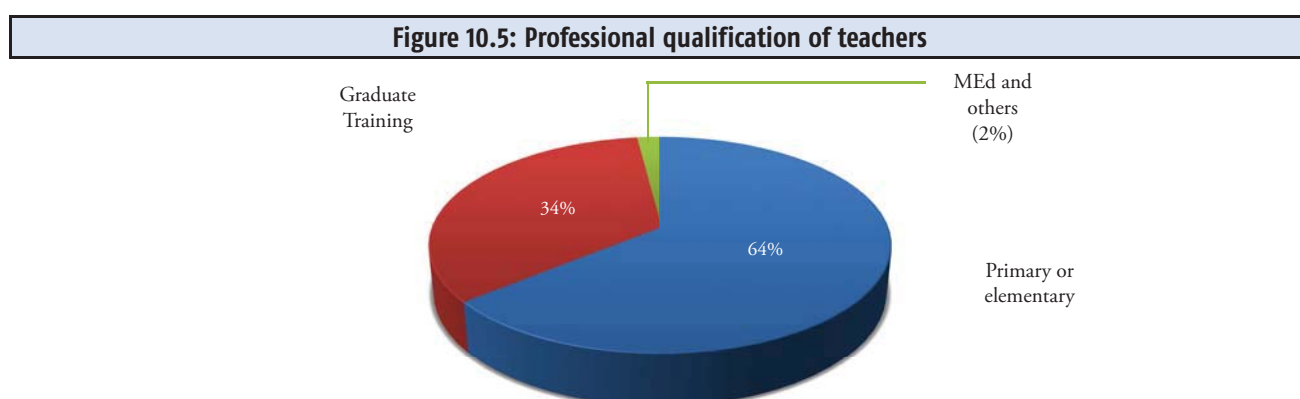
Survey data shows that 64% of teachers were primary/elementary teaching certificate or diploma holders. The percentages of graduate and post-graduate degree in professional courses were 34% and 2% respectively.

10.2.2 In-service training programme

In the states, various agencies such as SCERT, DIET, BRC, CRC etc. organise in-service training programmes for teachers to update them with the latest trends and build their capacity for their classroom teaching. Teachers were asked how many such programmes they attended during the last two years. The information collected reflects the activeness of various academic agencies in organising in-service training programmes.

Figure 10.6: In-service training programme attended by teachers
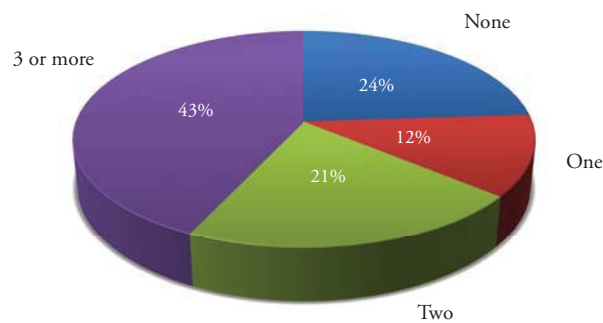
Number of training programmes attended: Figure 10.6 shows that nearly a quarter of teachers did not attend any training programmes, 12% of teachers attended one, 21% two and 43% three or more training programmes.

10.2.3 Attending training programmes based on NCF-2005

NCERT gave academic help to states for providing training to teachers in the National Curriculum Framework (NCF), 2005. NCERT also organised many training programmes at Delhi and also in states to train key resource persons. Figure 10.7 indicates that overall 37% of teachers attended a training programme based on NCF 2005.

Figure 10.7: Teachers attended training based on NCF-2005
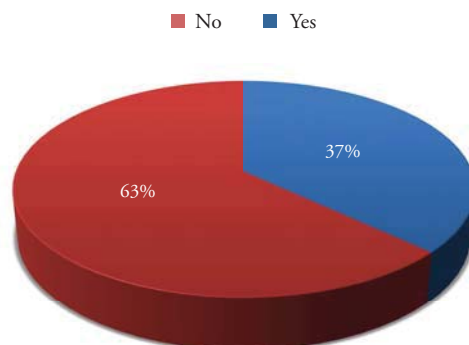
10.3 Teaching Learning Process

With the introduction of NCF-2005, there was a paradigm shift in the teaching learning process. The new option was a constructive approach which believed that pupils construct their own knowledge and that the teacher was a

facilitator who guided the pupils to think, to solve problems and to learn on their own. This demanded a change in role of teachers, learning environment, instructional strategy, methods of teaching, curriculum and assessment of students. Information on some of the above variables such as teaching style, academic facilities and modification of curriculum according to NCF-2005 etc. was sought in this questionnaire.

10.3.1 Teaching style and academic facilities

To teach in the classroom and track the progress of students' learning, teachers use various strategies. Giving homework is one of the techniques used and the assessment of homework helps teachers to know the students' pace of learning. Teachers are also provided with a 'Teacher's Diary' to maintain a day-to-day record of activities planned and executed in the class. This helps teachers as well as supervisors to know what teachers did on a particular day in a period in a class. It also helps teachers in planning for a lesson to be taught in the class as well as to note down specific queries made by the students on a particular topic. If required, the teacher's diary may also be used as a tool for assessment of teachers' work in the school.

For teaching in the class, teachers use the teacher's handbook, teaching learning material (TLM), and audio-visual facilities. Under SSA, there is a provision of Rs. 500 per annum for a teacher for development of TLM. Readymade TLMs are also available for the use of teachers on different topics in a subject.

Further under SSA, teacher resource centres (TRC), cluster resource centres (CRC) and block resource centres (BRC) have been developed in each district of the country. The role of these agencies is to provide academic support to teachers to accelerate the teaching learning process. To understand the status of all these, the information was collected under the following heads:

- Homework
- Teacher's diary
- Resources available
- Academic support

The outcomes are presented below:

10.3.2 Homework

Figure 10.8 shows that fewer than 1% of teachers did not give homework at all, while 14% of teachers gave homework sometimes, and 85% of teachers gave homework regularly.

Figure 10.8: Teachers give homework
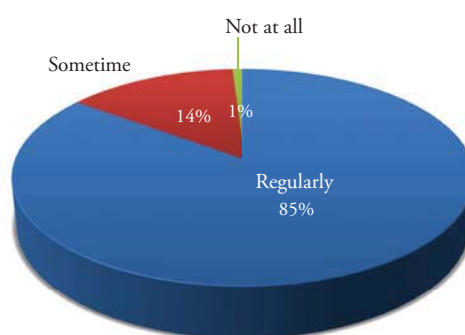
10.3.3 Teacher's diary

Figure 10.9 indicates that 87% of teachers reported maintaining a teacher's diary.

Figure 10.9: Teachers diary
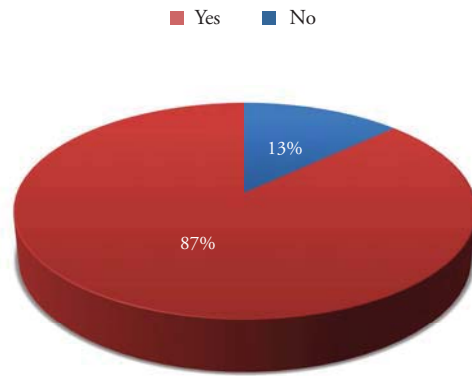
10.3.4 Teaching aids and TLM grant

Figure 10.10 shows the availability of teaching aids – teacher's handbook (82%), TLM 94%, audio-video facilities (43%), and TLM grant (77%).

Figure 10.10: Academic facilities available in schools
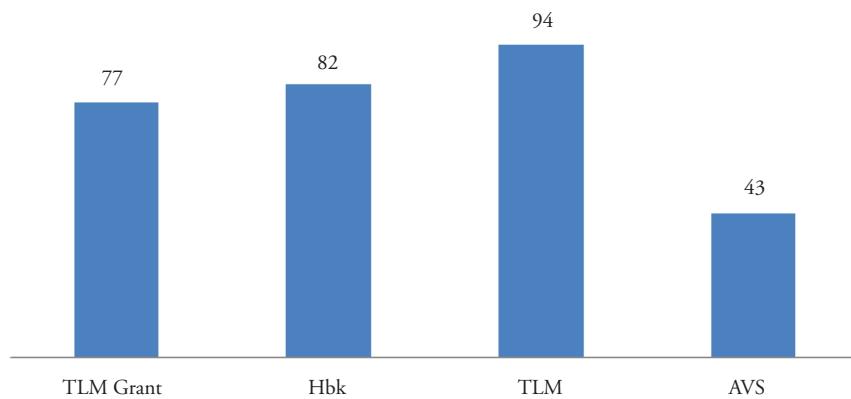
10.3.5 Interaction with other teachers

Interaction among teachers helps to clear up doubts in organising content for development of a lesson plan and using TLMs. It also helps teachers to improve teaching methodology and cover concepts in an improved way. Anecdotal evidence suggests that the practice is fairly unusual and that schools do not encourage such type of practices. To compare this perception with the situation on the ground, teachers were asked about their experience in this.

Discussion about how to teach a particular concept: According to Figure 10.11, 56% of teachers reported that discussion among teachers about how to teach a particular concept took place "1 to 3 times per week", 40% of reported "2 to 3 times per month" and 4% of teachers said that such discussions almost never took place.

Figure 10.11: Discuss how to teach a particular concept
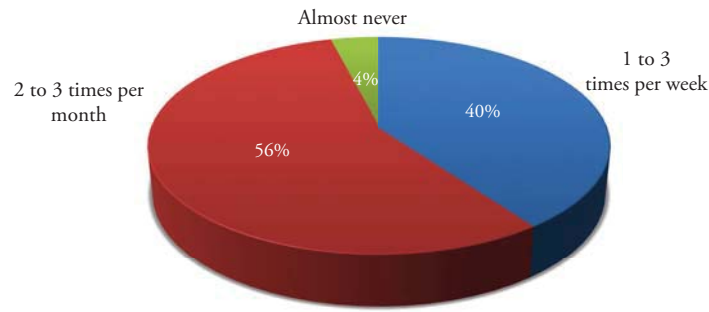
Working on preparing instructional materials: Figure 10.12 shows that 41% of teachers reported interacting with colleagues to develop instructional materials 1–3 times in a week, 50% of teachers 3–5 times a week but 9% of teachers almost never interacted in this way.

Figure 10.12: Working preparing instructional materials
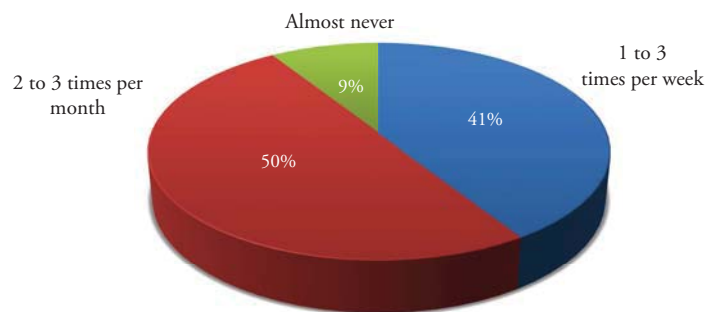
Visit to another teacher's classroom: Figure 10.13 indicates that 30% of the teachers almost never visited another teacher's classroom to observe his/her teaching, and 29% and 41% of teachers reported that they visited another teacher's classroom to observe his/her teaching 1–3 times per week and 2–3 times per week respectively.

Figure 10.13: Visit to observe another teacher's classroom
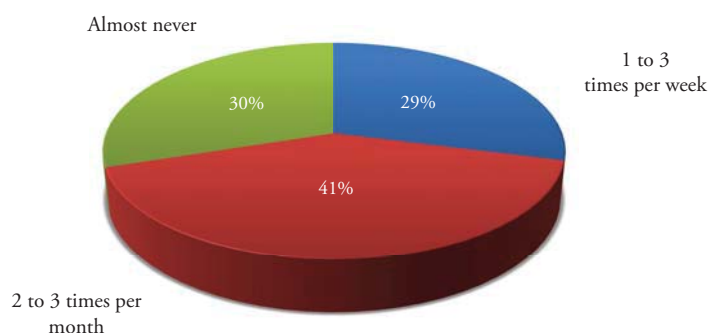
Informal observation of my classroom by another teacher: Figure 10.14 indicates that overall, 28% of teachers reported that their classroom teaching was almost never observed by another teacher, 47% of teachers were observed 2–3 times per month by another teacher and 25% of teacher's classroom teaching was observed 1–3 times per week by another teacher.

Figure 10.14: Informal observation of classroom by another teacher
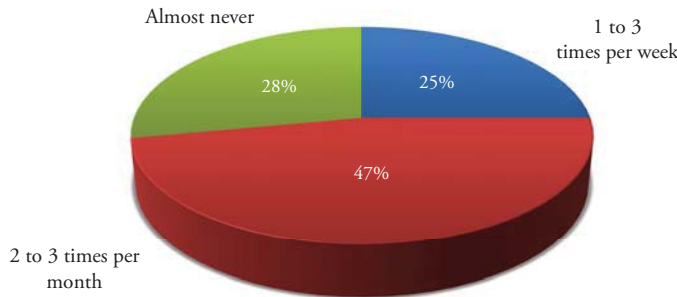
10.4 Problems in School

Under the drive to Universalisation of Elementary Education, Central Government and State Governments have made heroic efforts to bring all the children of 6–14 years in school. To give it legal back up, the Government of India passed the Right to Education Act (2009). In addition under SSA since 2000, the Government of India has provided large sums of money to the states for implementing the minimum required infrastructure for schools to provide quality education to our children. In spite of the efforts made under SSA, there is need to work more in this area.

a) *School building needs significant repair*: Figure 10.15 shows that overall 16% of teachers felt that the need of significant repair in the school building was a serious problem whereas 51% of teachers felt that it was a minor problem. Overall, only one-third of school buildings do not need repairing.

Figure 10.15: Visit to observe another Teacher's Classroom
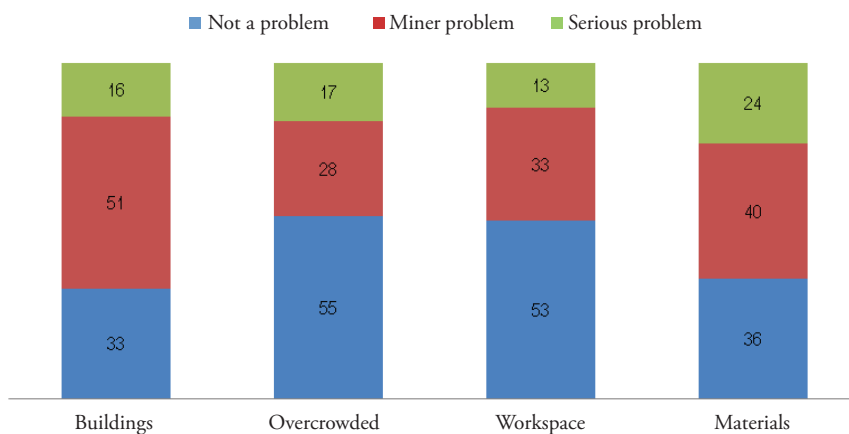
b) *Classrooms are overcrowded*: For a healthy atmosphere in the classroom, the teacher–pupil ratio should be appropriate and there should be proper space for sitting of the students. Figure 10.15 shows that overall, 17% of teachers considered it as a serious problem, 28% as a minor problem and for the rest it was not a problem.

c) *Inadequate workspace outside the classroom*: Teachers need some space outside the classroom for preparation of TLM and organising relevant activities. Teachers were asked to respond about the working space outside the classroom. The responses are presented in Figure 10.15. Around 13% of teachers reported that they did not have adequate workspace outside their classroom and that it was a serious problem, 33% of teachers considered it as a minor problem and remaining 55% of teachers considered it as not a problem at all.

d) *Materials are not available*: Figure 10.15 indicates that 28% of teachers reported non-availability of material as a serious problem, 41% of teachers reported it as a minor problem and 31% did not consider this a problem.

10.5 Teachers' Opinion about the School

It is important to know how well the teachers are aware about the curriculum goals, whether they are satisfied with their job, and what are their expectations from students and parents. Opinion about these factors directly or indirectly indicates teacher's motivation and school environment where he/she is teaching.

Figure 10.16: Informal Observation of Classroom by another Teacher
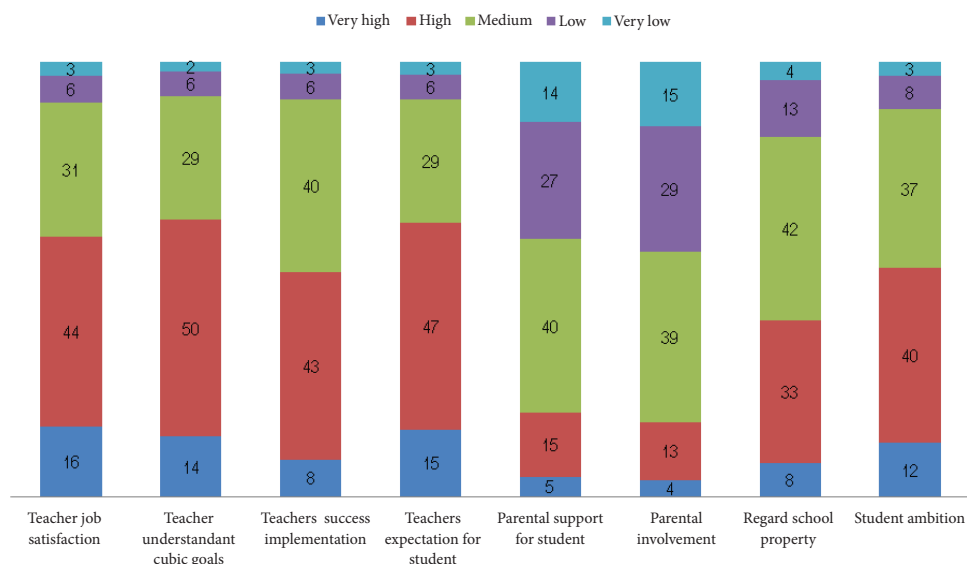
The responses on each sub-item were analysed separately and are presented below:

a) *Teacher's job satisfaction*: 60% of teachers reckoned that teachers in their school were highly satisfied with their job while only 9% reckoned that teachers had low job satisfaction.

b) *Understanding of curriculum goals*: Understanding of curriculum goals is very important for planning of teaching learning strategies and classroom activities. If a teacher does not understand curriculum goals, then it will be difficult for him/her to translate it into the classroom. Figure 10.16 indicates that 64% of teachers thought that teachers in their schools had a high understanding of curriculum goals whereas only 8% reckoned that teachers had a low/very low understanding of curriculum goals.

c) *Success in implementing the curriculum*: About half of the teachers feel that teachers' degree of success in implementing curriculum is high or very high in their schools.

d) *Expectations for student achievement*: 62% of teachers reported their expectations for their students were high, whereas only 9% of teachers reported low expectations for the students.

e) *Teachers' view regarding parents support and involvement*: One-fifth of the teachers were of the opinion that parental support was very high.

f) *Parents' involvement in school activities*: Overall, 17% of teachers reported parents' involvement was high and very high whereas 44% of teachers reported it as low.

g) *Student regard for school property*: Around 41% of teachers answered that students in their schools had high or very high regard for school property but 17% of teachers reported that their students had low or very low regard for school property.

h) *Students' desire to do well in school*: 52% of teachers reported their students had the desire to do well in school and 11% of teachers thought that students did not have the desire to do well in the school.

Teachers were asked about their perception of school safety, whether the school was located in a safe neighborhood, whether they felt safe at the school, and whether the school's security policies were sufficient (Figure 10.17). A substantial majority considered that the school and its environs were safe, but rather worryingly, approximately one-fifth of those responding considered that at least one of these was unsafe.

Figure 10.17: Teachers' perception of school safety
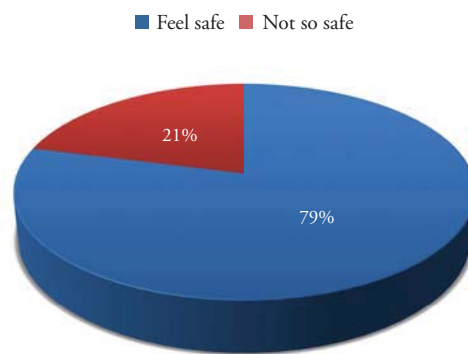
Part II-Teacher Factors and Student Attainment
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In this survey, teachers were asked about their qualifications and experience, the subjects they taught, classroom processes, and their views about the school.

Teachers are generally accepted to be the most important system input into the learning process. However, it is easier to say this than actually to assess teacher effects, especially from a survey of this nature. First, the study deals with students who have been in school for at least five years. Encountering a range of teachers during that time and cross-sectional studies such as NAS will deal only with the last of these. Second, information in a teacher questionnaire, especially relating to classroom practice, is typically self-reported: it is well known that teacher and student reports of the same classroom frequently do not agree. Also, it is difficult in this study to ensure that teachers' data is related to the students they teach. Around 10% of the teachers did not indicate which subjects they taught. This is in addition to the usual caveats over direction of causation and the possibility that both learning attainment and its supposed cause are in fact the products of some more fundamental influence, such as home background and resources. To some extent we can investigate this last possibility by allowing simultaneously for the influence of the key variables, socio-economic status and home language. If a relation between a factor and an outcome is not extinguished by making such allowances, it is reasonable to suggest that the factor is having an effect on the outcome. Inferences will however be less reliable based on the teacher questionnaire because of the factors noted earlier in this paragraph.

Many teachers (over 40% of respondents) answered more than one section of the questionnaire and will have taught more than one of the three subjects, and over a quarter appear to have taught all three. All teachers who replied to the section in the questionnaire relating to Language teaching are included in the analyses.

10.6 Treatment given to Variables used in Analysis

The variables considered under the teacher background are as under:

Table 10.2: Teacher-related variables and its treatment for regression variables

Variables	Categories of Variables	Treatment
Gender	a) Male, b) Female	'MALE' as a base category
Category	a) Scheduled Castes, b) Scheduled Tribes, c) OBCs, d) Others	'OTHERS' as a base category
Age	a) Below 30 yrs, b) 31–40 yrs., c) 41–50 yrs., d) 51–65 yrs	'Below 30 yrs' as a base category
Academic qualification	a) Middle or secondary, b) Higher/Sr secondary, c) Graduation, d) Post graduation	'Middle or secondary' as a base category
Professional qualification	a) Graduate, b) Others	'Others' as a base category
Training programmes	a) One, b)Two, c) More than three, d) None	'None' as a base category
Training programme based on NCF-2005	a) Yes, b) No	'NO' as a base category
Professional development activities	a) Yes, b) No	'NO' as a base category
Teaching experience	a) Up to 5 yrs, b) 5–20 yrs, c) More than 20 yrs	'Up to 5 yrs' as a base category
Years in school	a) Up to 5 yrs, b) 5–10 yrs., c) More than 10 yrs	'Up to 5 yrs' as a base category
Employment status	a) Regular full time, b) Para teacher, etc	'Regular full time' as a base category
Regular homework	a) Yes, b) No	'NO' as a base category
Teacher's diary	a) Yes, b) No	'NO' as a base category
Periods per week	a) 1–21, b) 22–34, c) 35 and above	'1–21' as a base category
Interaction with other teachers	a) Discussions about how to teach a particular concept, b) Working on preparing instructional materials, c) Visits to another teacher's classroom to observe his/her teaching, d) Informal observations of my classroom by other teachers	'NO' as a base category
Activities in Language class	a) Listen to a story and answer the questions put by you, b) Talk to each other on a given topic and come out with observations/conclusions, c) Work together in pairs or small groups and report the conclusions orally in the class, d) Read storybooks/ newspapers /magazines on their own, e) Use dictionary to work out meaning of the unknown words used in the text, f) Write compositions on given topics, g) Relate what you read in the text with your real life experiences	'At least once a week' as a base category
Teaching resources	a) Teacher's handbook, b) Teaching learning material, c) Audio-video facilities	'NO' as a base category
Problems with facilities	a) The school building needs significant repair, b) Classrooms are overcrowded, c) Teachers do not have adequate workspace outside their classroom, d) Materials are not available to conduct experiments/investigations	'NO' as a base category
TLM grant	a) Yes, b) No	'NO' as a base category
Safety in School	a) This school is located in a safe neighbourhood, b) I feel safe at this school, c) This school's security policies and practices are sufficient.	'NO' as a base category
Teachers' Attitude	a) Teachers' job satisfaction, b) Teachers' understanding of cuuriculum goals, c) Teachers' high degree of success in implementing the curriculum, d) Teachers' high expectations for student achievement	'NO' as a base category

10.7 Personal Characteristics

Personal characteristics of teachers such as gender, category and age were considered.

Table 10.3: Regression results – Gender-wise				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	Girls	3.74	1.31	**
With key variables	Girls	2.09	1.28	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 10.4: Regression results – Category-wise				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	SC	−3.47	2.04	NS
	ST	−3.74	1.8	NS
	OBC	−0.99	1.77	NS
With key variables	SC	−1.85	2	NS
	ST	−2.5	1.72	NS
	OBC	−0.1	1.71	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 10.5: Regression results – Age-wise				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	31–40	1.1	1.84	NS
	41 to50	3.66	2.01	NS
	51 to 65	0.91	2.17	NS
With key variables	31–40	0.54	1.82	NS
	41 to50	2.46	1.97	NS
	51 to 65	−0.27	2.09	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Category and age of the teachers did not have a statistically significant relation with the attainment of the students. Female teachers were associated with slightly higher attainment, but this difference was not statistically significant after allowing for the key student variables of socio-economic status and student's home language.

10.8 Academic and Professional Qualifications

Teachers' education is an important aspect of their efficacy. They were asked about their academic and professional qualifications.

Table 10.6: Regression results – Academic qualification				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	Higher secondary	1.88	2.24	NS
	Graduate	0.38	1.93	NS
	Post grad	3.24	2.27	NS
With key variables	Higher secondary	1.53	2.21	NS
	Graduate	−0.56	1.93	NS
	Post grad	1.49	2.26	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Teachers' highest academic qualifications are not significantly related to attainment.

Table 10.7: Regression results – Professional qualification				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	Graduates	3.43	1.41	*
With key variables	Graduates	1.98	1.36	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Teachers with graduate professional qualifications are more likely to be in schools with higher attaining students, but this difference is relatively small and is not statistically significant after allowing for key student variables.

10.9 In-service Training

Teaching ability is not something that stands still as teachers are regularly offered the opportunity to attend in-service training courses. Teachers were asked about the number of in-service training programmes they had attended during the past two years and, more specifically, whether they had attended any training programme based on NCF-2005.

Table 10.8: Regression results – In-service training programmes				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	One	1.02	2.08	NS
	Two	2.02	1.67	NS
	More than 3	2.04	1.62	NS
With key variables	One	0.67	1.94	NS
	Two	2.81	1.58	NS
	More than 3	2.23	1.56	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 10.9: Regression results – Attended training programme based on NCF–2005				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	Yes	0.23	1.13	NS
With key variables	Yes	0.48	1.12	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

The majority had attended one or more in-service training course, including an NCF-based one. However, there is no statistically significant relationship with the attainment of students in these schools.

Table 10.10: Regression results – Participation in professional development activities

Variables		Coeff	SE	Sig.
Without key variables	Yes	0.84	1.87	NS
With key variables	Yes	1.19	1.79	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Teachers were also asked whether they had participated in any professional development activities. The majority had participated in one or more of these but this showed no statistically significant relationship with the performance of the students in the school.

10.10 Teaching Experience and Employment Status

Of course teachers' training and formal qualifications are not the only indicator of how capable they are. Experience is also a major contributor.

Table 10.11: Regression results – Years of teaching experience

Variables		Coeff	SE	Sig.
Without key variables	Over 5 up to 20	1.57	1.37	NS
	Over 20	1.74	1.79	NS
With key variables	Over 5 up to 20	1.78	1.33	NS
	Over 20	1.17	1.75	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 10.12: Regression results – Years in the school

Variables		Coeff	SE	Sig.
Without key variables	Over 5 up to 10	1.12	1.44	NS
	Over 10	4.35	1.33	**
With key variables	Over 5 up to 10	1.09	1.45	NS
	Over 10	2.45	1.32	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Length of time in the school of the surveyed teacher is positively related with students doing better in schools where the teacher has been for over 10 years, though the strength of this relation is reduced by allowing for the key background factors of the students. It may be that teachers find schools with a higher socio-economic intake more congenial and consequently stay there longer.

Table 10.13: Regression results – Employment status

Variables		Coeff	SE	Sig.
Without key variables	'Para', etc	−8.67	1.95	**
	Other	−7.68	2.28	**
With key variables	'Para', etc	−6.2	1.92	**
	Other	−6.6	2.08	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Conversely, students do not achieve as well in schools where the surveyed teacher is a temporary or para teacher and these relationships remain statistically significant and fairly sizeable after allowing for key student background factors. Para and shiksha karmi teachers are often a part of a programme to reach children in remote rural areas.

10.11 Teaching Practices

Teachers were also asked about how they taught. The majority gave regular homework and kept a teacher's diary. Only the latter showed a statistically significant association with the attainment of the students at their school.

Table 10.14: Regression results – Regular homework

Variables		Coeff	SE	Sig.
Without key variables	Yes	−1.59	1.67	NS
With key variables	Yes	0.05	1.58	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 10.15: Regression results – Teachers' diary

Variables		Coeff	SE	Sig.
Without key variables	Yes	6.82	1.86	**
With key variables	Yes	7.79	1.8	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 10.16: Regression results – Periods/Week

Variables		Coeff	SE	Sig.
Without key variables	22 to 34	−0.26	1.53	NS
	35 and over	1.16	1.34	NS
With key variables	22 to 34	−1.02	1.52	NS
	35 and over	2.15	1.31	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Number of periods taught per week is not related to the attainment of the students in the study.

It is likely that an enquiring attitude and enthusiasm for communicating knowledge will lead to increased contacts with other members of staff in the school. Teachers were asked about interacting with other teachers.

Table 10.17: Regression results – Interaction with other teachers

Variables		Coeff	SE	Sig.
Without key variables	Yes	1.60	1.34	NS
With key variables	Yes	2.27	1.31	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Over three quarters of the surveyed teachers were doing this regularly in one or more of these ways, but the attainment difference was not statistically significant.

The respondents were divided into two groups – those who, on an average, carried out all these activities at least once a week, and the rest.

Table 10.18: Regression results – Regular activities in class

Variables		Coeff	SE	Sig.
Without key variables	No	−2.13	1.13	NS
With key variables	No	−2.67	1.1	*

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

There was no statistically significant relationship between this and attainment of the students in their schools on its own but there was a weak positive relationship with number of activities in the classroom after allowing for the key variables of socio-economic background and language spoken at home.

10.12 Teaching Resources

Having proper resources is an important adjunct of successful teaching.

Table 10.19: Regression results – Teaching resources

Variables			Coeff	SE	Sig.
Teacher's handbook	Without key variables	Yes	8.45	1.64	**
	With key variables	Yes	7.82	1.6	**
Teaching Learning Material (TLM)	Without key variables	Yes	−1.93	2.37	NS
	With key variables	Yes	−0.81	2.26	NS
Audio–Video facilities	Without key variables	Yes	4.69	1.1	**
	With key variables	Yes	3.75	1.08	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Attainment in Language has a statistically significant positive relation with having a teacher's handbook and audio-visual services, and these relationships are not substantially reduced by allowing for key background student variables. There is no statistically significant relation with the availability of TLM.

Teachers were asked about the severity of some possible problems with the school facilities. Table 10.20 shows those where at least one of the problems was rated as 'serious'.

Table 10.20: Regression results – Problems with facilities: one rated as 'serious'

Variables		Coeff	SE	Sig.
Without key variables	Yes	−6.2	1.25	**
With key variables	Yes	−5.07	1.17	**

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Fewer than half reported having at least one as a serious problem. Students in these schools were less successful. This difference was not substantially affected by allowing for key background variables.

Table 10.21: Regression results – TLM grant				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	Yes	−3.51	1.55	*
With key variables	Yes	−3.07	1.49	*

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Teachers were asked if they had got TLM grants for this year. Three quarters of respondents stated that they had, but this was related to slightly poorer performance by students. This relation was not substantially affected by allowing for key background variables.

10.13 Attitudes and Views

Attitudes of staff are also important. Perhaps most important is whether they feel the school is a safe place for them.

These were combined to form an indicator of whether teachers find the school safe. Teachers were divided into two groups—those answering negatively to any of these questions, and the rest.

Table 10.22: Regression results – School is safe				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	Yes	2.86	1.52	NS
With key variables	Yes	1.52	1.47	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Teachers considered their schools safe by a large majority, but this did not appear to be related to student attainment in a statistically significant degree. It is perhaps worrying that nearly one in five teachers felt that the school or its surroundings were not safe.

Teachers were also asked to assess qualities of staff in the school. Teachers' job satisfaction and expectations for student achievement had a statistically significant but small relationship with attainment in their school, but this became non-significant after allowing for key student variables. Teachers' understanding of curriculum goals and teachers' degree of success in implementing the curriculum did not have a statistically significant relation with attainment.

Table 10.23: Regression results – Teachers' high job satisfaction				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	Yes	2.63	1.17	*
With key variables	Yes	2.13	1.13	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 10.24: Regression results – Teachers' high understanding of curriculum goals				
Variables		**Coeff**	**SE**	**Sig.**
Without key variables	Yes	1.48	1.2	NS
With key variables	Yes	0.8	1.16	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 10.25: Regression results – Teachers' high degree of success in implementing the curriculum				

Variables		Coeff	SE	Sig.
Without key variables	Yes	0.45	1.34	NS
With key variables	Yes	−0.06	1.33	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

Table 10.26: Regression results – Teachers' high expectations for student achievement				

Variables		Coeff	SE	Sig.
Without key variables	Yes	2.77	1.27	*
With key variables	Yes	2.08	1.27	NS

*Significant if P<.05, **Significant if P<.01, NS–Not Significant

10.14 Conclusion

Any conclusions from these results have to be extremely tentative because of the precarious nature of the link between teachers and students in this study as the teacher may not have been with the student concerned for more than one year. This also means that any relationships found may well be underestimates of their actual size. Statements about positive (negative) relationships between teacher aspects and student attainment should be interpreted to say that on an average, students in a school where the teachers were surveyed had a particular tendency to do better (less well). These comparisons are made first as a straightforward univariate comparison and then allowing for the key variables of socio-economic status and home language. If a relation between a factor and an outcome is not extinguished by making such allowances, it is reasonable to suggest that the factor is having an effect on the outcome. Inferences will however be less reliable based on the teacher questionnaire because of the factors noted earlier in this paragraph.

With these caveats, it can be noted that teachers' personal characteristics (age, category) do not have a statistically significant relation with attainment, and nor does highest academic qualification. Gender (female) has a small positive correlation but this is not statistically significant after allowing for the key variables.

There is a small positive relation with having a post graduate professional qualification, though this is no longer statistically significant after allowing for the student key variables of socio-economic status and language spoken at home. Recent in-service training and participation in professional development do not appear to be related to attainment.

Years of teaching experience does not have a statistically significant correlation with attainment, but years of teaching in that school does, though this relation is substantially decreased by allowing for key student variables.

Students at schools with para teachers, shiksha karmi or comparable arrangements have lower attainment. This may be because such teachers are often a part of a programme to reach children in remote rural areas. Lower attainment also occurs where the teachers are temporary. This could be because they have not had time to settle in, or because such appointments are an indication of problems in recruiting.

Giving homework regularly is not related to higher performance, though this finding disagrees with the analogous results from the student and school questionnaires. On balance, the other two results seem to be more credible for the reasons described above. Keeping a teacher's diary is positively related to attainment. Number of periods taught per week does not show a statistically significant relation with student attainment. Extent of interaction with other

teachers is also not related to student attainment, but engaging regularly in a wide range of Language activities has a (weak) positive relationship.

Proper resources are an important contributor to successful teaching. Having a copy of the teachers' handbook and audio-video facilities are positively related to student attainment. However there is no statistically significant relation with having TLM. In schools where teachers reckoned that there were severe problems in some aspects of school facilities, attainment was lower. Performance was slightly lower in schools where the surveyed teacher reported having received a TLM grant that year.

Teachers were also asked about attitudes and opinions. Most teachers considered their school to be safe. However, one-fifth of students in the sample were taught by teachers who did not feel that their school was entirely safe. The relation with student attainment was not statistically significant. Having a high degree of job satisfaction and high expectations for student achievement were slightly related to achievement, though these relations became non-statistically significant after allowing for student background factors. Surprisingly, teachers' high understanding of curriculum goals and high degree of success in implementing the curriculum were not related to school attainment. It should be noted that these questions relate to a teacher's opinion of the staff in general, not necessarily to his or her own situation.

The following factors appear to have a robust effect on attainment in Language, in the sense that the relationship is statistically significant and is not extinguished by allowing for other important variables including home resources and language of instruction spoken at home:

- Years of teaching at the current school
- Para teachers, shikshakbadh or shiksha karmi (negative)
- Teacher's diary
- Range of activities in the classroom
- Teacher's handbook
- Audio-Visual facilities
- Severe problems with facilities (negative)
- TLM grant (negative)

Chapter 11

Equity and the Success of the Sarva Shikhsa Abhiyan Programme in providing Equality of Opportunity

CHAPTER 11 EQUITY AND THE SUCCESS OF THE SARVA SHIKHSA ABHIYAN PROGRAMME IN PROVIDING EQUALITY OF OPPORTUNITY

Sarva Shiksha Abhiyan (SSA), a flagship programme of the Government of India, provides a variety of inputs designed to ensure access, equity and quality in elementary education. This will not necessarily provide equality of attainment, since, as this report documents, there are factors which promote educational success other than those provided by official school-based inputs. Such factors include home resources and the relationship between the language spoken at home and the language of tuition.

This chapter looks at the extent to which the programme has succeeded in providing equal school and school-related resources and facilities for all, regardless of background. This could be characterised as equality of opportunity or equity of treatment. To this end, we consider the qualities of the schools and teachers who are engaged in providing the education in them. Of course this can be only a partial snapshot, since it relates to the most recent year, not to the whole education career of the students in the study. However, this can give a picture of where the SSA project has arrived at most recently, if not during the entire career of the students. Similarly, the teachers in the study, in many cases, will have taught the students for the most recent year, and indeed some of them may not have taught the students concerned at all. We are however able to get a picture of the current state of the schools at which the study pupils are attending. Another caveat is also relevant: these results apply only to government and government-aided schools. As discussed earlier, a proportion of pupils attend private schools, and these proportions vary from state to state. Not all such private schools will have superior facilities, however.

We investigate the success of the project in building on existing circumstances in providing equity by comparing the facilities to two particularly disadvantaged groups with more favoured groups. As is well known throughout the world, young people from houses with low socio-economic resources do less well, on average, than those in better-off homes. This project therefore compares the educational experience, as identified by this study, of the students identified as in the lowest fifth of the socio-economic index, with the rests of the population. The groups in the lowest fifth are designated as disadvantaged for the purposes of this chapter.

The second comparison has a particularly Indian reference. Chapter 2 showed that students in the three scheduled groups – *SC*, *ST* and *OBC* – were substantially less successful in Language than those in the General or Other group, and chapters 4 and 6 showed the same pattern in Mathematics and EVS. Of the three scheduled groups, the least successful was the ST group. The second set of analyses described in this chapter therefore compare the education circumstances of the ST group with those of the General or Other group.

A selection of educational circumstances is compared between the less favoured groups and the comparison groups. The circumstances to be compared come from the school and teacher questionnaires, and comprise ones discovered to be related to outcomes in this study, and some other ones which would generally be considered important when the topic is discussed. They are grouped into four categories, namely Physical Resources, Characteristics of Teachers, Atmosphere and Ethos of School Attended, and School-related Home Behaviour.

Physical Resources

1. Well-resourced: Schools are divided into well-resourced (20 or more of the 26 resources asked about in the study), and those less well-resourced.

2. High student–teacher ratio: Schools are divided into those with a student–teacher ratio of 40 or less, and over 40.

3. School has a computer (Yes/No).

4. Ratio of students to computer less than 2.0 vs the rest.

5. Days in school year 200 or more vs those which for whatever reason were unable to manage this.

6. School has a Science lab (Yes/No).

7. School has a member of staff to help with Science experiments.

8. School has official SSA textbooks in all three subjects (Language, Mathematics and EVS).

9. School has official SSA workbooks in all three subjects.

10. School has official SSA handbooks in all three subjects .

11. School has teaching and learning materials in all three subjects.

Qualities of Teaching Staff

This combines formal qualifications and experience.

1. It is generally accepted that it is important that teachers should have undergone a formal training. This variable compares the proportions with Graduate qualifications in the groups.

2. Formal qualifications are not the only consideration. It is often considered that teachers need to have a degree of practical experience to be able to utilise their full potential. The variable identified those with more than five years experience.

3. Age also goes with experience, and often authority. We compare the proportions of teachers aged over 30.

4. Stability of staff is important. We compare the proportions of teachers who have been for over five years in their current school.

5. Classroom practice is important so we compare the proportions who keep a teacher's diary

6. We also compare the proportions who report using the teacher's handbook

7. State that they give regular homework. It is not enough of course just to give homework. It is important to ensure that it is done and checked. (Pupils' reports of homework given and checked are described separately below under home–school interaction.)

School Atmosphere and Ethos

It is not sufficient to have good facilities and well-qualified staff, though obviously this will be very important. It is important that the school atmosphere and general ethos both of students and teachers are positive.

1. Unpleasant experiences: Students were asked about a number of unpleasant experiences at school, namely, something of yours was stolen; you were hit or hurt by other pupils; you were made to do things that you did not want to; you were called by names; you were left out. This variable compares the number of these unpleasant experiences that students reported.

2. Problem behaviour: School principals were asked about problem behaviours amongst students, specifically, arriving late at school; absenteeism; skipping class; violating dress code; classroom disturbance; cheating; profanity; vandalism; theft; intimidation/verbal abuse of other students; physical injury to other students; intimidation/verbal abuse of teachers/staff; physical injury to other teachers. If the school encountered any of these once a week or more, it was considered to have problem behaviours among students.

3. Feel safe: Teachers were asked about their perception of school safety, whether the school was located in a safe neighborhood, whether they felt safe at the school, and whether the school's security policies and practices were sufficient. If they were happy with all of these, then the school was described as having teachers who felt safe.

4. Difficulty recruiting. This was where a school reported that it was very difficult to fill vacancies.

5. Understanding curriculum. Respondents to the teacher questionnaire reported that teachers' understanding of the curricular goals was high or very high.

6. Success implementing curriculum. Respondents to the teacher questionnaire reported that teachers' degree of success in implementing the curriculum was high or very high.

Home–School Interaction

1. Absenteeism. Elsewhere in this report, it was found that the proportion of pupils being absent for a substantial proportion of the previous month was rather high. For whatever reason, illness or simply non-attendance, this is likely to affect attendance, and this was confirmed in chapter 8 of this report. This variable looked at the proportion of students absent from school for one week or more in the previous month.

2. Homework every day. In chapter 8 it was found that giving homework every day was related to attainment in Language.

3. Homework checked at home. This was found to be related to attainment in Language, but not after allowing for other home circumstances.

4. Homework checked at school. There was little variation in this as vast majority of pupils reported that their homework was checked in school, but such variation as there was certainly related to attainment.

11.1 Investigating Disadvantage: Findings

Tables 11.1 to 11.5 compare the proportion of the disadvantaged group of students (defined as those coming from the lowest fifth of the socio-economic index) falling in a particular category with the corresponding proportion for the rest (i.e., more advantaged students). In an equitable situation, the proportions for the two groups will not be significantly different.

Table 11.1: School facilities					
Characteristic	**Rest**	**s.e.**	**Disadvantaged**	**s.e**	**signif**
Well-resourced	0.36	0.04	0.26	0.02	*
Student–Teacher ratio (More than 40)	0.12	0.01	0.15	0.02	
Pupils per computer (Less than 2)	0.52	0.09	0.53	0.09	
School has computer	0.47	0.00	0.30	0.01	**
200 days per year	0.78	0.01	0.83	0.01	**
Science laboratory	0.3	0.01	0.17	0.01	**
Help with Experiments	0.63	0.01	0.55	0.01	**
Problems with facilities	0.49	0.01	0.49	0.01	
Textbooks in all subjects	0.89	0.01	0.88	0.01	*
Workbooks in all subjects	0.61	0.01	0.61	0.01	
Handbooks in all subjects	0.73	0.02	0.69	0.02	*
Teaching and learning material in all subjects	0.82	0.02	0.83	0.01	

SE is the standard error associated with the measured proportion for the group.
** P<.01 and * P< .05

Table 11.2: Teachers

Characteristic	Rest	s.e.	Disadvantaged	s.e	signif
More than 5 years in a school	0.47	0.04	0.41	0.01	
Teaching experience (More than 5 years)	0.68	0.01	0.66	0.02	
Age (More than 30 years)	0.8	0.01	0.78	0.01	
Graduate Qualification	0.65	0.01	0.64	0.02	
Regular teachers	0.83	0.02	0.79	0.02	
Keep teacher's diary	0.86	0.01	0.89	0.01	
Teacher's handbook	0.84	0.01	0.83	0.01	
Give regular homework	0.87	0	0.9	0.01	**

** P<.01 and * P< .05

Table 11.3: Atmosphere and Ethos

Characteristic	Rest	s.e.	Disadvantaged	s.e	signif
Unpleasant experiences	1.27	0.01	0.98	0.03	**
Problem behaviour	0.23	0.02	0.25	0.02	
Feel safe	0.74	0.01	0.72	0.02	
Difficulty in recruiting	0.14	0.02	0.16	0.02	
Understanding curriculum	0.65	0.09	0.65	0.04	
Success in implementing curriculum	0.53	0.08	0.53	0.02	

SE is the standard error associated with the measured proportion for the group. For this variable, students were asked about the frequency of unpleasant experiences; hence the reported value is a number not a proportion.
** P<.01 and * P< .05

Table 11.4: Home–School Interaction

Characteristic	Rest	s.e.	Disadvantaged	s.e	signif
Absent for 1 week or more	0.68	0.00	0.73	0.01	**
Homework every day	0.71	0.01	0.77	0.01	**
Homework checked at home	0.85	0.01	0.7	0.01	**
Homework checked in school	0.97	0.002	0.97	0.002	**

** P<.01 and * P< .05

11.2 Summary of Findings

Facilities

Table 11.1 compares the 'disadvantaged' group (the lowest fifth on the socio-economic index) with the remainder of the population on a range of school physical resources. It can be seen that there still is a gap in provision of school resources between the two groups and provision, or lack of it, seems to reinforce socio-economic inequalities. Students from a disadvantaged background are less likely to be in schools which:

- Are well-resourced

- Have a computer

- Have a Science lab

- Have assistance with Science experiments
- Textbooks in all three subjects
- Handbooks in all three subjects

They are also less likely to be in schools which have had fewer than 200 days per year. If this result is reliable, it may be that teachers in this type of school are working harder to compensate for the other disadvantages, but it is difficult to interpret without knowing more of the background.

There is no detectible difference on schools having:

- High number of students per teacher
- Fewer than 2 pupils per computer
- Serious problems with facilities
- Workbooks in all three subjects
- Teaching and learning materials

Teachers

There is no detectible difference in teacher qualifications or experience, but teachers of the disadvantaged group are more likely to report that they 'give regular homework'.

Atmosphere and Ethos

There is only one difference in atmosphere and experience, namely that disadvantaged students are less likely to report having had unpleasant experiences in school.

Home–School Interaction

Pupils from disadvantaged homes are more likely to:

- Exhibit absenteeism
- Have homework every day

And less likely to:

- Have their homework checked at home.

There is a small difference on having homework checked in school, but only in the third decimal place.

11.3 Scheduled Tribes

Tables 11.5 to 11.8 show the results of comparing the students in the ST category with those in General or Other group.

Table 11.5: School facilities

Characteristic	Other	s.e.	ST	s.e	signif
Well-resourced	0.39	0.01	0.22	0.01	**
Student teacher ratio (More than 40)	0.13	0.01	0.09	0.01	**
Pupils per computer (Less than 2)	0.51	0.02	0.58	0.02	**
School has computer	0.48	0.01	0.51	0.01	*
200 days per year	0.79	0.01	0.76	0.01	
Science laboratory	0.34	0.01	0.26	0.01	**
Help with Experiments	0.66	0.01	0.52	0.01	**
Problems with facilities	0.49	0.01	0.43	0.01	**
Textbooks in all subjects	0.89	0.01	0.89	0.01	
Workbooks in all subjects	0.6	0.01	0.56	0.01	*
Handbooks in all subjects	0.71	0.01	0.74	0.01	*
Teaching and learning material in all subjects	0.84	0.01	0.73	0.01	**

** P<.01 and * P< .05

Table 11.6: Teachers

Characteristic	Other	s.e.	ST	s.e	signif
Unpleasant experiences	0.46	0.03	0.53	0.02	
Problem behaviour	0.68	0.02	0.63	0.01	*
Feel safe	0.82	0.01	0.76	0.01	**
Difficulty in recruiting	0.69	0.04	0.60	0.04	
Understanding curriculum	0.88	0.01	0.79	0.02	**
Success in implementing curriculum	0.83	0.01	0.83	0.04	
Unpleasant experiences	0.89	0.01	0.78	0.02	**

** P<.01 and * P< .05

Table 11.7: Atmosphere and Ethos

Characteristic	Other	s.e.	ST	s.e	signif
Unpleasant experiences	1.19	0.02	1.32	0.02	**
Problem behaviour	0.22	0.01	0.22	0.01	
Feel safe	0.74	0.01	0.69	0.01	**
Difficulty in recruiting	0.14	0.01	0.15	0.01	
Understanding curriculum	0.7	0.02	0.54	0.01	**
Success in implementing curriculum	0.57	0.02	0.42	0.02	**

** P<.01 and * P< .05

Table 11.8: Home-School interaction

Characteristic	Other	s.e.	ST	s.e	signif
Absent for 1 week or more	0.69	0.00	0.69	0.01	
Homework every day	0.74	0.01	0.60	0.01	**
Homework checked at home	0.86	0.00	0.69	0.01	**
Homework checked in school	0.97	0.00	0.97	0	

** P<.01 and * P< .05

11.4 Summary of Findings

Resources

The picture is less clear cut for the comparison between STs and the General or Other category. ST students are less likely to be in schools which:

- Are well-resourced
- Have a Science lab
- Have help with experiments
- Have serious problems with facilities
- Have all three workbooks
- Have teaching and learning materials

However, they are also less likely to be in schools which:

- Have student:teacher ratio over 40
- Have more than 2 pupils/computer
- Be open less than 200 days/year

They are more likely to have:

- All three workbooks

Teachers

Teachers in the schools where ST students attend are less experienced, younger and less likely to be full time regular teachers. They are less likely to keep a teacher's diary or to claim that they give regular homework.

Atmosphere and Ethos

ST students are more likely to have had unpleasant experiences at school and less likely to feel safe. There is no detectible difference in misbehaviour and difficulties in recruiting. They are less likely to feel that teachers in their schools:

- Understand the goals of the curriculum
- Be successful in implementing the curriculum

Home/School

ST pupils are less likely to have homework every day, or to have it checked at home. There is no detectible difference in absenteeism or in having their homework checked at school.

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Appendices

Appendix – I

Sample Design and Procedures

This appendix to the class V National Achievement Survey (NAS) report explains the sample design and the sampling methods of the survey. It describes the target and sample populations and the sample selection procedures. It sets out the necessary exceptions and their impact on the achieved sample. It also discusses sample weights and sample variance estimation within the survey.

Class V (NAS) Target Population

The class V (NAS) was designed to investigate learning achievement in the government system at the level of the state or union territory (UT). Hence, the target population was all class V children studying in government and government-aided schools. Sample schools included those managed by the Department of Education, Tribal/Social Welfare Departments and local bodies as well as private-but-government-aided schools. This follows the classification categories of the District Information System for Education (DISE). Completely private schools were not included in this survey. *Zila Parishad* (ZPH) is a local government body at the district level in India. It looks after the administration of the rural area of the district and its office is located at the district headquarters. ZPH translates to District Council. These schools are established, supervised and funded by the ZPH district level authorities. ZPH schools provide education for students from grades 6-10 of the Secondary School Certificate. Schools run by the central, state or local governments are referred to as 'government' schools. Schools run by private managements but funded largely by government grant-in-aid are known as private aided or just 'aided' schools.

The survey was available to all 35 states and UTs. However, Arunachal Pradesh, Dadra Nagar Haveli and Lakshadweep could not participate. Manipur participated in the survey's administration but faced problems in data collection and failed to report its data on time. Among the 31 participating states and UTs, six states - Jharkhand, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal - could not test class V students at the end of their school year and so decided to test class VI children at the beginning of the next school year. For the states which tested class VI students instead of class V students, the sampling rules described here do not apply. The coverage in these states was considered adequate, bearing in mind, however, that the target sample was not exactly as defined in the remaining population.

Population Exclusions

As is the case in other large-scale educational surveys, some sub-populations were excluded from the total target population at the initial stage of sampling. For logistical reasons, the class V (NAS) excluded schools with fewer than nine or, in some cases, five students depending on the enrolment characteristics of the state/UT. In addition to this 'small school exclusion', the survey excluded 'Upper Primary Only' schools due to a classification error.

As a result of these exclusions, population coverage of the class V sample varied from 99% in Tripura down to 7% in Assam. In five states/UTs - Assam, Daman & Diu, Goa, Kerala and Maharashtra - the population coverage fell below 80%, mainly due to the exclusion of Upper Primary Only schools. Table A-1.1 shows population coverage of the class V (NAS) sample after the sub-population exclusions.

Group	State or Union Territory	Target population size	Criteria of small school exclusion	Class V in Upper Primary	Population size after all exclusions	Population coverage (percent)
Coverage 80% or greater	A & N Islands	6,471	Enrolment < 5		6,185	96
	Andhra Pradesh	8,90,628	Enrolment < 9	Yes	7,48,686	84
	Bihar	18,67,758	Enrolment < 9		18,29,071	98
	Chandigarh	11,315	Enrolment < 5		10,880	96
	Chhattisgarh	4,36,829	Enrolment < 9		3,78,128	87
	Delhi	1,91,010	Enrolment < 9		1,88,360	99
	Gujarat	8,45,998	Enrolment < 9	Yes	8,12,042	96
	Haryana	2,63,773	Enrolment < 9		2,48,801	94
	Himachal Pradesh	1,07,540	Enrolment < 5		1,00,447	93
	Jammu & Kashmir	1,36,877	Enrolment < 5		1,26,546	92
	Karnataka	8,66,323	Enrolment < 9		7,83,450	90
	Madhya Pradesh	14,71,511	Enrolment < 9		13,34,000	91
	Manipur	25,071	Enrolment < 5		24,315	97
	Orissa	8,22,711	Enrolment < 9	Yes	7,64,962	93
	Puducherry	14,184	Enrolment < 5		14,055	99
	Punjab	2,59,748	Enrolment < 9		2,39,451	92
	Rajasthan	8,80,421	Enrolment < 9		7,38,258	84
	Tamil Nadu	9,03,890	Enrolment < 9		8,47,321	94
	Tripura	81,519	Enrolment < 5		80,658	99
	Uttar Pradesh	30,63,248	Enrolment < 9		30,08,197	98
	Uttarakhand	1,33,500	Enrolment < 5		1,23,251	92
Coverage less than 80%	Assam	6,42,984	Enrolment < 9	Yes	43,888	7
	Daman & Diu	2,387	Enrolment < 5	Yes	1,196	50
	Goa	21,795	Enrolment < 9	Yes	11,007	51
	Kerala	4,40,487	Enrolment < 9	Yes	2,58,722	59
	Maharashtra	17,62,636	Enrolment < 9	Yes	9,36,810	53

Table A-1.1: Effect of sub-population exclusions on population coverage in states and UTs where Class V students were tested (data from DISE 2007-8)

Sample Design and Selection

In general, developing the sample for each state/UT involved a three-stage cluster design which used a combination of two probability sampling methods, Probability Proportional to Size (PPS) sampling and Simple Random Sampling (SRS). In SRS, all sampling units have an equal probability of being selected. When PPS is applied, larger sampling units have a higher probability of selection than smaller units.

At the first stage of sampling, districts were selected using PPS sampling principles. This means that the probability of selecting a particular district depended on the number of class V students enrolled in that district. The number of districts to be selected from a state/UT was determined using an adaptation of the Finite Population Correction (FPC) formula in which it was assumed that a sample of twenty districts was sufficient for representing an infinite population of districts. Hence, the following formula was used to calculate the number of sample districts from each state:

$$n_i = n_0/(1 + n_0/N_i)$$

where

n_i = number of districts to be sampled from ith state/UT;

n_0 = number of districts required to represent infinite population of districts (taken as 20);

N_i = number of districts in i^{th} state/UT.

At the second stage, in the chosen districts, the requisite number of schools was selected using the PPS principles. The measure of size was based on class V enrolment data from the District Information System for Education (DISE) 2007/08. Within selected districts, schools were sorted according to this measure of size to give an implicit stratification before taking a systematic sample. (In Goa and some north eastern states, the PPS approach was not applied due to administrative error and/or discrepancies between the sampling frame data and the reality in the field.) The number of schools to be sampled from a district was determined by the total number of students required for testing and the average class size within the state/ UT. The number of selected schools for each district varied between 20 and 60. One replacement school was assigned for each sample school. Twice as many schools as required were selected in pairs, with one of each pair being selected and the other being utilised as a reserve, in case it was not possible to collect data from the original.

The class V (NAS) covered three subjects: Language, Mathematics and Environmental Studies (EVS). In most schools, two of the three subjects were assigned for testing. However, in Mizoram, Nagaland, Chandigarh, Pudducherry, Daman & Diu, and Andaman & Nicobar Islands students were tested in all three subjects.

At the third stage, the required number of students in each school was selected using SRS. In schools where class V had multiple sections, an extra stage of selection was added with one section being sampled at random. A lottery method was used to choose a section and students in a sample school. The maximum number of students to be tested from a school was set as 36 with exceptions in several UTs. In the absence of prior information on the magnitude of design effects, the project followed the effective practice of international studies and aimed for a sample with a target size in the neighbourhood of 4.000 except for the smallest states.

Once students were selected, they were tested in the assigned subjects of their schools. Three different test forms of each subject were evenly distributed among selected students. Table A-1.2 summarises the criteria applied to the sampling of the survey by state. One aspect of this table may come as something of a surprise to readers not familiar with the details of sampling theory. The precision of a statistic from a sample is a function of the size of the sample and is essentially independent of the size of the population from which it comes. So, from tables A-1.1 and A-1.2, it can be seen that the size of the target samples from Uttar Pradesh (school Year V population 30,63,248) and Himachal Pradesh (school Year V population 1,07,540) are comparable, despite the wide range in population sizes.

Table A–1.2: Sampling criteria by state					
State or Union Territory	Total number of districts	Number of districts to be used	Average sampled class size	Number of schools to be selected per district	Estimated total number of students to be tested	Maximum number of students per school to be tested
Andhra Pradesh	23	11	18	23	4,554	36
Assam	23	12	18	23	4,968	36
Bihar	37	13	18	20	4,680	36
Chhattisgarh	16	11	18	23	4,554	36
Delhi	9	7	27	23	4,347	36
Goa	2	2	36	50	3,600	45

Gujarat	25	11	18	23	4,554	36
Haryana	20	11	18	23	4,554	36
Himachal Pradesh	12	9	9	50	4,050	36
Jammu & Kashmir	22	10	9	50	4,500	36
Karnataka	33	11	18	23	4,554	36
Kerala	14	8	24	23	4,416	36
Madhya Pradesh	48	14	18	20	5,040	36
Maharashtra	35	15	18	20	5,400	36
Orissa	30	13	18	20	4,680	36
Punjab	20	11	18	23	4,554	36
Rajasthan	32	11	18	23	4,554	36
Tamil Nadu	30	11	18	23	4,554	36
Tripura	4	4	24	50	4,800	36
Uttar Pradesh	70	16	18	20	5,760	36
Uttarakhand	13	9	9	50	4,050	36
A & N Islands	3	2	18	50	2,700	all
Chandigarh	1	1	36	60	2,160	45
Daman & Diu	2	2	36	50	1,800	all
Puducherry	4	2	18	50	2,700	45

Sampling Frame, Sample Weights and Sample Variance Estimation

In the survey, the PPS sampling method for districts and schools was based on class V enrolment data from the DISE 2007/08. Simple random sampling was conducted according to the class registers available in selected schools. Although the DISE data was not free from criticism, it was used because it was considered to be the most complete and up to date enrolment data available at the time of sampling. Unfortunately, due to discrepancies in the DISE data, limitations in the sampling method and loss of information at the sampling and administration stages of the survey, it was impossible to estimate sample weights for the survey. Therefore, student responses of class V (NAS) data were equally weighted within their state/UT data and each state/UT carried equal weight as a reporting unit. Because of the arrangements for replacing non-co-operating schools with an equivalent (see above), it is considered that response rates at the school level are essentially satisfactory, though no data is available on this. Unfortunately, no data is available for non-response within selected schools.

Class V (NAS) adopted systematic probability sampling techniques and matrix sampling methods to improve its cost-effectiveness and to reduce the burden on students of responding to a long test. However, improving the efficiency of the survey came at a cost of some variance or uncertainty in the analysis. In order to quantify this uncertainty, the survey estimated the standard errors due to sampling for all reported statistics. Various techniques were explored. For the key statistical indicators, a replication procedure (jack-knife method) was used to estimate standard errors.

Aggregation of results

There is no completely satisfactory resolution to the question of how to aggregate data from this study. The project's approach to analyses was to include all data weighted equally no matter from which state it originated. In practice, this meant a slightly different practice for overall scores as well as for comparisons between population subgroups. In the overall state scores (Chapters 2, 4, and 6), results were reported separately for states with over 80% coverage and those with below 80%. States which tested in school Year VI formed a separate reporting group.

It was considered that the 80% threshold meant that state results were sufficiently robust to compare with each other. The overall results reported for this group were simply the results for the aggregate of the pupils in the analyses. It is important to note that such results are not the average for the pupils nationally since states with larger populations are not weighted more highly, as they would be, for a national or group pupil average. Overall mean results reported are a close approximation to a 'state' average where each state's performance is weighted equally. In contrast, overall results from 'below 80% states' were not considered sufficiently robust to compare with each other or with the 'over 80%' states.

Analyses comparing results within states were not partitioned into the three groups according to coverage, since all results within a state would have been selected according to the same sampling procedure and, thus, closer to being equivalent. This also applies to subgroup comparisons, such as between genders or categories.

Design Effects

The design of the sample, whereby schools were sampled, and then pupils within the sampled schools, rather than a simple random sample, meant considerable advantages in terms of convenience of administration and in efficiency of use of school time. Conversely, it meant that it reduced the precision of results in comparison with a simple random sample. The impact of sampling clusters rather than individual students is known as the design effect, and can be of considerable use in planning future surveys with a similar design. One commonly used measure of the design effect is the statistic 'rho' defined below.

Use capital E in estimated variance of achieved sample

$$\text{Rho} = \frac{\text{estimated variance of achieved sample}}{\text{Estimated variance of a simple random sample of the same size}}$$

The design effect for the three subjects tested in the class V NAS calculated from the survey data is shown in Table A-1.3 below.

Table A–1.3: Design effects NAS Class V		
Subject outcome	**deff**	**sqrt_deff**
Language	6.54	2.56
Mathematics	8.32	2.88
EVS	8.81	2.97

These results mean that, for example, the variance of the estimate of the mean language score is over six times as large as that of a simple random sample of pupils of the same size, and that to give the same degree of precision, the sample would need to be over six times as large for estimating the mean of the Language score, and over eight times as large for Mathematics and EVS. The last column, labelled sqrt_deff, shows the ratio of the standard errors; thus, the standard error for Language for the achieved design would be two and a half times as large as that for a comparable simple random sample.

Appendix – II

Scaling the NAS data and estimating sampling variance

IRT scaling of the NAS data

The aim of the NAS 2010 survey was to achieve an assessment of a wide coverage of the class V curricula in Mathematics, EVS and Language. This meant that a relatively large number of items was required to cover the curriculum adequately. Thus, there were a total of 80 items in Mathematics and EVS while there were 50 items in Language. Since the number of items in each subject was far too many to present in a single test booklet, a complex matrix-sampling booklet design was adopted with individual students responding to a subset of the items in the assessment and not the entire assessment item pool. This meant that the entire set of items was taken - but not by any single student. The sample design is described in more detail in Appendix - 1.

The survey used Item Response Theory (IRT) scaling to describe student achievement on the assessment. This allowed comparable achievement scores to be calculated for each student, even though individuals responded to different parts of the item pool.

A total of nine assessment booklets were prepared, three for each subject, covering the entire set of items and linked to each other by a set of 'anchor' items which were included in all three booklets for any subject. An example is given in Figure A-2.1 below. This is for Mathematics, but the design is the same for EVS and very similar for Language.

Figure A-2.1
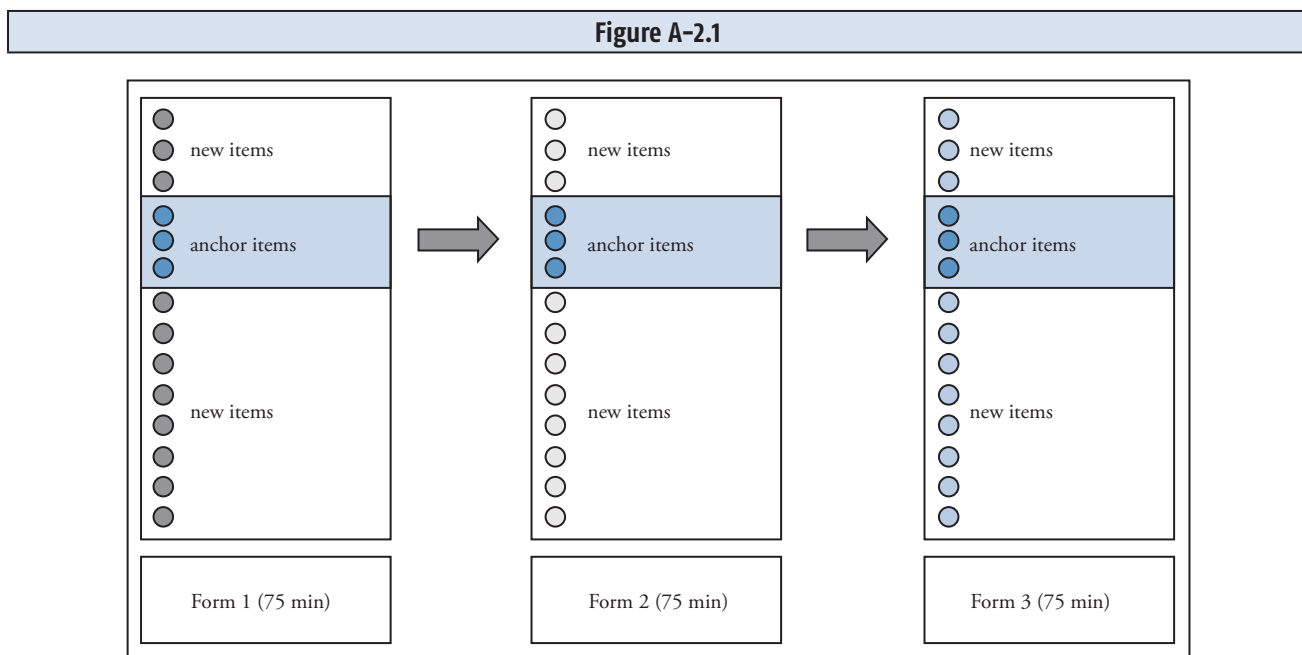
This chapter reviews the psychometric models used in scaling the 2010 class V (NAS) data. The project used the commercially available software BILOG-MG 3 (Zimowski, Muraki, Mislevy and Bock, 1996) in order to apply IRT models.

The IRT scaling approach used here is similar to that used in the international survey Trends in Mathematics and Science Study (TIMSS). This was originally developed in the US by the Educational Testing Service (ETS) for use in the National Assessment of Educational Progress (NAEP) and in the UK by the National Foundation for Educational Research for the Assessment of Performance Unit (Beaton [ed.], 1987; Foxman, Hutchison and Bloomfield, 1993).

Three distinct IRT models, depending on item type and scoring procedure, are most generally used in the analysis of assessment data. These are the one-parameter, two-parameter and three-parameter logistic models. Each is a 'latent variable' model that describes the probability that a student will respond in a specific way to an item in terms of the student's unobserved attainment level and various characteristics of the item. For a description of IRT scaling, see Hambleton and Swaminathan (1985), Thissen & Wainer (2001).

One-parameter logistic model (1-PL model)

The expression for P_{ij} the probability of the ith examinee, ability q_i, being successful on the jth item, difficulty b_j is given by

$$P_{ij} = \frac{\exp(\theta_i - b_j)}{1 + \exp(\theta_i - b_j)}$$

$$= \frac{1}{1 + \exp[-(\theta_i - b_j)]}$$

There is only one parameter for each item, namely the difficulty b_j. The one parameter logistic model is mathematically equivalent to the Rasch model (Andrich, 1988).

Two-parameter logistic model (2-PL model)

The expression for P_{ij} the probability of the ith examinee, ability q_i, being successful on the jth item, difficulty b_j is given by (Thissen and Wainer, 2002).

$$P_{ij} = \frac{\exp[a_j(\theta_i - b_j)]}{1 + \exp[a_j(\theta_i - b_j)]}$$

$$= \frac{1}{1 + \exp[-a_j(\theta_i - b_j)]}$$

This is comparable to the 1-PL model with the addition of a scaling or slope parameter a_j which varies between items. (This parameter is related to the item's power of discrimination across the ability scale.)

Three-parameter logistic model (3-PL model)

The expression for P_{ij} the probability of the ith examinee, ability q, being successful on the jth item, difficulty b_j is given by (Thissen and Wainer, 2002).

$$P_{ij} = c_j + (1 - c_j)\frac{\exp[a_j(\theta_i - b_j)]}{1 + \exp[a_j(\theta_i - b_j)]}$$

$$= c_j + (1 - c_j)\frac{1}{1 + \exp[-a_j(\theta_i - b_j)]}$$

where a_j is a scaling parameter which varies between items, and c_j is the lower asymptote, or 'pseudo-guessing' parameter.

The 2-PL model was used to calibrate the test items. Under assumptions of the 2-PL model, the probability of a response to an item is modelled based on the examinee's ability, the item difficulty, and the item discrimination. While other models are available for calibrating the items, the 2-PL model was chosen over the 1-PL or Rasch Model

because upon inspection of the item characteristics, the item discriminations were not seen as comparable across the pool of items (an assumption of the Rasch model). The 2-PL was chosen over the 3-PL model because the 3-PL model has stricter assumptions over the other models and also has higher requirements with regards to sample size and coverage of the ability distribution in order to be able to obtain reliable estimates of all item parameters, in particular, the 'guessing' parameter. This results in unstable and often inestimable parameters for some of the test items. The 2-PL model offered a widely acceptable compromise between the lesser and more restrictive IRT models available.

Using this approach, a separate scale was developed for each subject. The mean of each of these three scales was set to 250 and the standard deviation to 50. For Mathematics and EVS, this meant that achieved scores ranged approximately between 100 and 400, while the range for Language was slightly less.

The joint probability of a particular response pattern across a set of items is given by:

$$P(x|\theta, params) = \prod_{i=1}^{n} P_{ij}$$

where P_{ij} is the probability of the ith individual being successful on the jth item.

This likelihood function is maximised to estimate item parameters and these parameters, in turn, are used to score observed student responses on the assessments.

Item calibration for the class V (NAS) 2010 was conducted using the commercially-available BILOG software (Zimowski et al., 1996). All student samples were weighted so that each state contributed equally to the item calibration.

Omitted and Not-Reached Responses

The matrix-sampling design meant that each student only got the opportunity to see the items in the booklet which they were given. Items which were not included in the booklet taken were treated as 'not presented', i.e., they were ignored in the analysis of the data. However, students could also fail to provide an answer to an item which was in their test booklet and which, in principle, they could have seen. There are various possible reasons for this: they could fail to make an attempt on an item by mistake because they didn't feel it was worth attempting or because they had given up or run out of time before reaching the end of the test. An item was considered 'not reached' when the item itself, all subsequent items and the item immediately preceding it were not answered.

Such 'not reached' items were treated differently in estimating item parameters and student proficiency scores. In estimating the values of the item parameters, items in the assessment booklets that were considered not to have been reached by students were treated as if they had not been administered. Conversely, 'not-reached' items were considered as incorrect responses when student achievement scores were generated.

Item Fit

The fit of the 2-PL model to the items was examined graphically and using a chi-squared fit index. This was done on a state by state basis. Items identified as problematic were investigated to see if there were any obvious faults and where possible, these were rectified. If it proved impossible to remedy the problems of an item, then that item was dropped from the scoring for the state concerned.

Reliability

Reliability of the test score scales was estimated from the IRT scaling BILOG (Zimowski et al., 1996) runs. For simplicity and familiarity, the marginal reliability coefficient is quoted here, rather than showing test information graphs (Thissen and Wainer, 2001). This is given by

$$\bar{\rho} = \frac{\sigma_\theta^2 - \sigma_e^2}{\sigma_\theta^2}$$

Where s_q^2 is the variance of the test score scale in the sample and s_e^2 is the mean error variance of scores, both available from BILOG output. The values estimated here are 0.83 for Language, 0.89 for Mathematics and 0.89 for EVS.

Estimating Sampling Variance

As described in Appendix A1, the NAS 2010 sampling design applied a stratified three stage cluster sampling technique in selecting pupils. This design was administratively convenient and caused minimal upheaval in schools. However, since pupils within a school generally are more similar to each other than they are to the population in general, this approach to sampling effectively provides less independent information than a simple random sample of the same size. This design effect means that standard errors cannot be accurately estimated using the usual formulae which are derived for use with simple random sample designs.

The jackknife repeated replication technique (JRR) was used in the class V (NAS) 2010 to calculate standard errors because it is computationally straightforward and provides approximately unbiased estimates of the sampling errors of means, totals and percentages. The procedure used follows the variation on the JRR technique used in TIMSS 2007 (Foy, Galia and Isaac 2008). It assumes that the primary sampling units (PSUs) can be paired in a manner consistent with the sampling design, with each pair regarded as members of a pseudo-stratum for variance estimation purposes. When used in this way, the JRR technique appropriately accounts for the combined effect of the between-and-within-PSU contributions to the sampling variance. The general application of JRR entails systematically assigning pairs of schools to sampling zones. Then, one of the schools is selected at random to have its contribution doubled, whilst the other school in the pair has its contribution set to zero. This constructs a number of 'pseudo-replicates' of the original sample. The statistic of interest (e.g., the state's mean achievement score) is computed once for the entire original sample, and once again for each jackknife 'pseudo-replicate' sample. The variation between the estimates for each of the jackknife replicate samples and the original sample estimate is the jackknife estimate of the sampling error of the statistic.

To produce a jackknife estimate of the sampling variance of a statistic t for a state, the schools in that state were paired to produce up to 100 paired zones. One hundred jackknife replicate samples were then created. For the hth zone, one of the two schools was selected at random and its weight was doubled, while at the same time, the weight of the other was set to zero. Weights in all other zones were left unchanged. $t(J_h)$, which is the value of the statistic for the hth replicate sample was then estimated. This process was repeated for all such strata. The jackknife sampling estimate for the sampling variance was then given by the following equation:

$$V_{jrr}(t) = \sum_{h=1}^{H} [t(J_h) - t(S)]^2$$

where H is the total number of sampling zones in the sample of the state under consideration, in this case 100. The term $t(S)$ corresponds to the statistic of interest for the state computed with the overall sampling weights unchanged. These calculations were carried out using the IDB Analyser (Foy and Olson 2009), which automatically computes standard errors as described in this section. Some specially written Statistical Packages for the Social Sciences (SPSS) routines were also used.

Appendix – III

Performance in Anchor Items

PERFORMANCE IN LANGUAGE

S. No.	State or Union Territory	Distribution										
		0	0–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	91 +
1.	A & N Islands	0.3	1.8	8.9	16.4	19.6	17.4	13.0	9.2	6.9	5.2	1.4
2.	Andhra Pradesh	0.1	0.6	4.4	10.3	15.1	16.1	16.4	14.4	11.4	8.3	2.9
3.	Assam	0.1	1.5	5.7	14.4	17.4	15.1	11.9	11.2	10.7	8.5	3.7
4.	Bihar	0.3	2.8	10.7	17.0	18.7	15.1	11.9	8.8	8.8	4.8	1.2
5.	Chandigarh	0.0	0.6	3.8	9.4	16.9	17.5	16.4	15.2	12.5	6.5	1.3
6.	Chhattisgarh	0.0	1.8	10.5	19.6	18.1	13.2	10.4	8.5	8.3	6.0	3.7
7.	Daman & Diu	0.0	0.2	3.6	8.8	16.4	18.5	17.4	10.6	10.3	10.6	3.7
8.	Delhi	0.0	0.7	3.7	8.6	12.0	12.7	14.6	14.2	14.6	13.4	5.5
9.	Goa	0.0	0.8	4.2	10.1	12.9	16.7	15.5	12.4	12.8	10.0	4.7
10.	Gujarat	0.0	1.0	4.8	9.6	13.9	13.8	16.4	16.1	14.7	7.7	2.1
11.	Haryana	0.0	1.2	5.8	14.1	19.9	16.7	14.3	10.9	8.3	5.9	2.9
12.	Himachal Pradesh	0.0	1.3	5.2	12.6	18.6	16.4	14.1	12.1	8.6	6.2	4.8
13.	Jammu & Kashmir	0.0	1.6	6.2	9.9	12.1	13.7	13.3	14.3	12.7	10.5	5.7
14.	Jharkhand	0.3	2.6	9.2	14.3	16.2	13.5	10.5	8.7	9.0	9.5	6.1
15.	Karnataka	0.0	0.6	3.5	7.9	11.0	12.8	14.2	14.8	15.4	13.7	6.0
16.	Kerala	0.0	0.5	2.7	5.7	7.8	10.4	12.7	17.6	20.5	16.9	5.0
17.	Madhya Pradesh	0.0	0.8	3.4	10.4	13.4	15.3	14.0	15.5	10.4	10.3	6.3
18.	Maharashtra	0.1	0.5	2.2	6.2	10.0	12.2	14.2	14.4	16.5	15.1	8.7
19.	Meghalaya	0.0	0.9	5.1	10.9	18.6	16.5	14.1	11.3	9.4	9.7	3.7
20.	Mizoram	0.0	0.1	1.0	4.1	9.7	15.6	19.0	21.5	17.1	9.7	2.2
21.	Nagaland	0.1	1.7	7.2	13.8	15.0	14.8	11.4	10.2	8.1	9.8	8.1
22.	Orissa	0.1	1.0	5.4	10.4	13.4	13.6	11.7	12.2	12.2	12.5	7.8
23.	Puducherry	0.0	2.0	10.3	21.1	22.7	17.1	11.4	6.7	4.1	2.5	2.2
24.	Punjab	0.2	2.8	10.3	14.8	15.9	15.5	13.8	13.6	10.5	2.7	0.0
25.	Rajasthan	0.0	0.7	5.2	10.9	15.2	12.6	12.5	13.6	13.1	10.3	6.0
26.	Sikkim	0.0	0.5	2.6	8.8	16.8	23.2	21.6	13.8	7.2	4.3	1.3
27.	Tamil Nadu	0.0	0.4	1.6	5.0	9.8	11.0	13.9	15.4	15.2	17.4	10.3
28.	Tripura	0.0	0.7	3.9	8.5	11.0	12.8	13.7	15.9	15.6	12.5	5.3
29.	Uttar Pradesh	0.0	0.8	2.8	4.9	6.0	6.5	8.2	13.0	15.3	21.1	21.3
30.	Uttarakhand	0.1	2.0	6.5	14.2	18.5	15.3	14.0	11.0	9.2	6.8	2.5
31.	West Bengal	0.0	0.4	3.0	5.3	8.5	13.4	14.3	14.9	15.9	15.7	8.8

Table A-3.1: Distribution of students on the basis of percent of scores obtained on anchor items in Language

Performance in Anchor Items

S. No.	State or Union Territory	Rural			Urban			Mean Diff (U–R)
		N	Mean %	SD	N	Mean %	SD	
1	Orissa	1,581	56.87	24.13	118	72.42	18.6	15.55
2	Chhattisgarh	1,484	46.33	23.11	122	57.05	21.01	10.72
3	Bihar	2,340	44.63	21.5	268	52.82	21.65	8.19
4	Assam	3,117	51.34	22.36	417	59.28	22.42	7.94
5	Sikkim	1,636	50.59	16.81	579	57.72	16.93	7.13
6	Goa	524	54.28	20.36	414	59.96	22.97	5.68
7	Gujarat	3,109	54.87	20.52	458	60.03	21.58	5.16
8	Haryana	2,830	49.66	21.04	427	53.19	20.57	3.53
9	Kerala	2,306	64.44	20.65	358	67.89	19.07	3.45
10	Puducherry	1,511	41.62	18.22	774	44.98	21.24	3.36
11	Mizoram	1,628	60.27	17.31	1,238	63.28	17.26	3.01
12	Meghalaya	1,696	52.99	22.59	767	55.42	19.57	2.43
13	West Bengal	2,475	64.01	21.57	551	65.52	21.27	1.51
14	Himachal Pradesh	2,124	52.1	22.14	302	53.13	19.41	1.03
15	Tamil Nadu	2,612	65.64	20.81	938	66.57	21.34	0.93
16	Maharashtra	3,293	63.79	21.25	1012	64.12	22.67	0.33
17	Chandigarh	880	53.91	19.05	1569	54.22	19.61	0.31
18	Jharkhand	2,790	50.72	25.16	447	50.98	23.93	0.26
19	Tripura	1,491	59.95	21.94	294	60.02	22.3	0.07
20	Rajasthan	1,879	56.97	23.2	440	56.47	21.36	−0.5
21	Punjab	2,209	47.01	20.68	378	46.12	19.45	−0.89
22	Andhra Pradesh	2,134	55.3	21.22	689	54.06	18.77	−1.24
23	Uttar Pradesh	2,730	71.27	23.7	302	69.77	25.33	−1.5
24	Karnataka	2,572	61.61	21.79	928	59.54	22.19	−2.07
25	Madhya Pradesh	1,515	57.61	22.35	187	54.22	21.44	−3.39
26	Uttarakhand	2,432	50.02	21.69	235	46.36	22.47	−3.66
27	Delhi	439	63.29	19.28	1867	59.09	22.59	−4.2
28	Jammu & Kashmir	2,424	57	23.36	251	51.77	23.23	−5.23
29	Daman & Diu	990	57.14	21.41	270	51.24	16.53	−5.9
30	Nagaland	1,079	56.42	24.23	249	42.77	22.79	−13.65
31	A & N Islands	2,372	46.72	20.7				−46.72

S. No.	State or Union Territory	Boys			Girls		
		N	Mean %	SD	N	Mean %	SD
1.	A & N Islands	1,194	44.44	20.15	1,178	49.03	21.00
2.	Andhra Pradesh	1,261	54.74	20.83	1,562	55.20	20.51
3.	Assam	1,717	51.55	22.04	1,817	52.97	22.93
4.	Bihar	1,346	45.75	21.24	1,262	45.18	22.09
5.	Chandigarh	1,248	53.65	19.82	1,201	54.59	18.97
6.	Chhattisgarh	744	47.44	22.97	862	46.89	23.27
7.	Daman & Diu	643	54.62	19.30	617	57.19	21.81
8.	Delhi	980	58.12	22.31	1,326	61.20	21.79
9.	Goa	435	52.97	20.89	503	60.10	21.90
10.	Gujarat	1,819	55.48	20.40	1,748	55.60	21.08
11.	Haryana	1,482	49.28	20.49	1,775	50.82	21.42
12.	Himachal Pradesh	1,150	51.65	22.04	1,276	52.75	21.61
13.	Jammu & Kashmir	1,365	56.18	23.63	1,310	56.85	23.14
14.	Jharkhand	1,596	51.81	24.95	1,641	49.73	25.00
15.	Karnataka	1,800	60.51	22.49	1,700	61.65	21.27
16.	Kerala	1,147	62.76	21.52	1,517	66.52	19.50
17.	Madhya Pradesh	883	58.74	21.70	819	55.62	22.77
18.	Maharashtra	2,110	63.28	21.69	2,195	64.44	21.48
19.	Meghalaya	1,061	53.20	21.77	1,402	54.17	21.68
20.	Mizoram	1,461	60.09	17.53	1,405	63.10	17.03
21.	Nagaland	622	54.89	24.72	706	52.96	24.37
22.	Orissa	855	57.72	24.03	844	58.19	24.19
23.	Puducherry	1,097	41.03	18.09	1,188	44.36	20.33
24.	Punjab	1,311	46.32	20.60	1,276	47.45	20.39
25.	Rajasthan	1,157	57.15	22.49	1,162	56.61	23.23
26.	Sikkim	1,024	52.68	17.00	1,191	52.25	17.24
27.	Tamil Nadu	1,698	65.78	20.94	1,852	65.98	20.97
28.	Tripura	924	59.27	22.15	861	60.71	21.81
29.	Uttar Pradesh	1,400	71.39	23.81	1,632	70.89	23.92
30.	Uttarakhand	1,242	49.61	20.92	1,425	49.78	22.51
31.	West Bengal	1,590	65.10	21.92	1,436	63.38	21.03

Table A–3.3: Gender wise average achievement on anchor items in Language

State or Union Territory	SC			ST			OBC			Other		
	N	Mean %	SD	N	Mean %	SD	N	Mean %	SD	N	Mean %	SD
A & N Islands	83	39.64	21.31	100	50.15	22.69	286	48.23	20.55	1,903	46.62	20.52
Andhra Pradesh	702	54.14	20.43	247	52.04	20.33	1114	54.63	20.6	760	57.3	20.87
Assam	446	51.52	22.65	491	44.6	19.41	1000	53.91	21.9	1,597	53.82	23.24
Bihar	415	45.75	20.74	113	39.69	20.53	1421	45.52	22.05	659	46.18	21.43
Chandigarh	415	51.82	18.67	34	54.12	15.3	108	54.91	19.68	1,892	54.57	19.6
Chhattisgarh	270	52.37	24.31	486	42.7	22.23	715	48.85	23.24	135	43.67	19.97
Daman & Diu	55	54.18	17.37	213	50.14	19.48	859	57.9	21.09	133	52.71	18.22
Delhi	347	58.96	22.34	101	49.11	22.82	212	58.49	22.34	1,646	60.93	21.74
Goa	24	43.13	22.01	135	50.04	20.67	125	57.48	19.76	654	58.56	21.88
Gujarat	364	53.3	20.78	323	50.5	20.93	2065	55.56	21.33	815	58.47	18.49
Haryana	1,250	47.86	20.99	150	49.9	24.05	918	50.66	19.92	939	52.63	21.28
Himachal Pradesh	786	51.83	22.33	120	48.92	21.5	320	46.08	20.75	1,200	54.45	21.44
Jammu & Kashmir	240	51.63	21.62	372	51.91	22.72	668	53.66	24.38	1,395	59.94	22.86
Jharkhand	418	46.5	24.31	595	48.16	24.27	1507	53.97	25.69	717	48.65	23.66
Karnataka	856	59.89	21.29	378	61.32	21.17	1487	61.42	22.83	779	61.53	21.13
Kerala	278	60.97	21.33	63	53.25	20.87	1230	65.44	20.56	1,093	65.97	19.84
Madhya Pradesh	339	56.02	20.6	320	57.7	22.82	830	56.07	22.16	213	63.05	23.64
Maharashtra	614	64.32	22.17	694	57.46	22.45	1138	64.3	20.97	1,859	65.84	21.01
Meghalaya	112	52.9	19.83	2107	54.03	21.85	42	48.57	17.51	202	52.33	22.1
Mizoram	104	63.13	17.38	2621	61.46	17.47	19	65.26	14.57	122	62.05	14.95
Nagaland	30	57.67	26.38	1125	53.84	24.88	40	49.88	26.08	133	54.4	20.59
Orissa	381	53.19	24.2	310	53.11	22.43	469	60.51	25.12	539	61.87	23.06
Puducherry	636	41.44	18.77	1	40		1333	44.13	20.01	315	39.62	17.15
Punjab	1,453	47.08	20.57	16	36.88	22.05	491	45.42	20.44	627	47.82	20.29
Rajasthan	575	53.55	23.21	339	53.39	22.01	1021	58.77	22.35	384	59.91	23.46
Sikkim	163	48.87	18.57	820	50.41	16.47	849	53.3	16.87	383	56.46	17.56
Tamil Nadu	889	66.1	20.64	96	61.77	19.93	1856	66.5	21.11	709	64.58	20.99
Tripura	374	59.65	21.42	496	57.35	23.62	350	60.77	21.37	565	61.96	21.06
Uttar Pradesh	716	71.96	24.05	62	66.05	23.92	1653	70.32	23.88	601	72.84	23.49
Uttarakhand	804	49.19	22.49	120	45.96	21.12	357	46.9	21.72	1,386	51.05	21.33
West Bengal	789	62.61	21.68	209	57.32	20.55	285	61.47	22.18	1,743	66.34	21.17

Table A–3.4: Social group wise average achievement on anchor items in Language

PERFORMANCE IN MATHEMATICS

State or Union Territory	Distribution										
	0	0–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	91 +
Nagaland	0.0	1.5	6.7	11.5	17.2	16.4	11.8	10.8	9.6	8.5	6.1
Rajasthan	0.0	1.7	6.0	11.5	13.7	13.5	13.1	12.6	13.3	9.9	4.7
Tamil Nadu	0.0	0.2	2.2	5.4	8.8	12.1	13.6	14.7	17.4	18.1	7.5
West Bengal	0.0	0.5	3.4	8.9	13.2	16.2	17.0	13.9	11.7	10.2	4.9
Daman & Diu	0.0	0.6	4.8	13.5	15.3	13.0	13.4	16.9	13.5	8.4	0.7
Andhra Pradesh	0.1	2.0	7.7	16.6	19.1	17.7	13.3	10.8	6.9	4.5	1.3
Delhi	0.1	1.4	3.5	9.4	12.8	14.3	14.0	13.2	12.5	11.9	6.9
Himachal Pradesh	0.1	1.3	4.9	10.8	17.6	19.6	16.8	12.0	8.0	5.9	3.1
Karnataka	0.1	0.4	3.1	7.7	11.5	13.1	12.3	15.1	16.5	14.6	5.6
Kerala	0.1	1.3	5.8	13.4	19.1	21.5	17.4	12.0	7.0	2.3	0.4
Madhya Pradesh	0.1	1.6	4.2	9.3	12.4	14.7	12.1	14.1	12.3	13.2	6.0
Mizoram	0.1	0.7	5.8	16.7	25.2	24.4	16.5	7.0	2.7	1.0	0.1
Sikkim	0.1	1.6	2.9	10.9	20.3	26.4	19.8	11.3	5.7	0.8	0.3
Puducherry	0.1	3.4	13.0	25.1	26.1	16.8	7.4	4.0	2.0	0.8	1.4
Haryana	0.2	2.2	7.2	12.8	19.9	17.9	14.4	10.2	7.3	5.4	2.6
Maharashtra	0.2	0.9	3.7	9.7	13.5	15.7	14.7	12.5	12.8	10.1	6.2
Meghalaya	0.2	0.7	4.8	12.6	19.3	20.3	15.5	11.2	7.2	6.2	2.0
Goa	0.3	1.0	7.5	14.7	21.5	22.1	15.0	9.0	5.4	2.5	1.1
Punjab	0.3	1.7	4.3	8.7	13.4	16.5	17.1	16.6	11.7	6.9	3.0
A & N Islands	0.3	1.7	7.9	20.6	25.0	17.6	11.0	6.7	4.3	4.1	0.8
Chandigarh	0.3	1.3	6.4	15.3	25.0	24.9	15.4	7.1	2.9	1.0	0.5
Jammu & Kashmir	0.4	1.8	5.1	9.6	11.7	13.6	12.0	13.4	12.8	12.9	6.6
Gujarat	0.5	1.8	7.1	13.7	16.0	14.8	14.3	14.8	9.7	5.9	1.6
Orissa	0.5	2.1	5.6	12.1	12.2	13.5	12.8	11.7	13.4	11.7	4.6
Uttar Pradesh	0.5	1.2	2.4	4.5	5.8	8.0	7.7	11.5	14.2	18.1	26.2
Uttarakhand	0.5	2.4	7.9	14.4	16.9	15.5	12.6	12.2	9.2	6.5	2.1
Assam	0.6	2.4	7.9	15.0	17.1	16.1	12.4	10.3	9.0	6.1	3.1
Jharkhand	0.8	3.6	7.3	12.7	15.1	14.1	11.8	10.4	11.3	8.8	4.2
Tripura	0.8	3.1	4.6	9.7	10.1	12.7	12.7	12.3	13.2	13.0	7.9
Bihar	0.9	4.6	9.4	13.0	15.6	14.2	12.1	10.4	9.0	6.9	4.0
Chhattisgarh	1.5	11.1	5.0	12.8	18.1	15.6	11.7	8.6	7.2	6.2	2.2

State or Union Territory	Rural			Urban		
	N	**Mean %**	**SD**	**N**	**Mean %**	**SD**
A & N Islands	2,395	43.56	18.61			
Andhra Pradesh	2,183	46.54	20.36	710	48.81	19.24
Assam	3,143	49.17	22.33	413	51.39	20.83
Bihar	2,323	49.29	23.96	264	50.42	22.04
Chandigarh	880	44.32	15.2	1,521	43.83	15.89
Chhattisgarh	1,428	46.31	23.97	267	42.27	22.87
Daman & Diu	986	56.44	20.93	270	45.8	17.41
Delhi	546	64.71	23.43	2,044	57.34	22.3
Goa	626	42.88	16.9	322	52.45	18.09
Gujarat	3,063	51.11	20.6	594	48.63	23.17
Haryana	2,771	49.28	21.22	427	47.1	18.77
Himachal Pradesh	2,182	51.61	20.27	242	56.07	18.55
Jammu & Kashmir	2,534	59	23.38	247	52.29	24.41
Jharkhand	2,818	52.37	24.29	570	50.81	21.41
Karnataka	2,520	63.66	21.99	1,156	56.88	20.51
Kerala	2,334	48.19	17.9	510	47.01	16.72
Madhya Pradesh	1,453	58.72	22.81	292	58.49	23.56
Maharashtra	3,203	59.17	22.08	1,260	53.94	22.13
Meghalaya	1,634	51.18	19.87	794	50.13	19.16
Mizoram	1,612	42.7	14.57	1,265	45.55	15.24
Nagaland	1,122	56.54	23.39	248	40.02	16.04
Orissa	1,506	55.03	23.67	275	61.47	22.39
Puducherry	1,510	37.58	16.07	775	37.93	18.72
Punjab	2,099	55.03	20.76	537	56.15	19.8
Rajasthan	1,937	54.47	23.14	533	59.44	22.41
Sikkim	1,696	47.05	15.39	483	52.62	15.32
Tamil Nadu	2,681	65.09	20.49	1,181	66.3	21.96
Tripura	1,574	58.13	24.68	272	63.24	23.31
Uttar Pradesh	2,709	72.88	23.56	362	72.94	26.95
Uttarakhand	2,546	50.23	21.95	321	46.09	19.87
West Bengal	2,480	57.4	21	674	58.99	21.65

Table A–3.6: Area wise average achievement on anchor items in Mathematics

	Boys			Girls		
	N	**Mean %**	**SD**	**N**	**Mean %**	**SD**
A & N Islands	1,212	42.78	19.03	1,183	44.36	18.14
Andhra Pradesh	1,331	45.91	19.52	1,562	48.11	20.56
Assam	1,733	49.26	22.05	1,823	49.59	22.28
Bihar	1,360	49.19	23.76	1,227	49.64	23.79
Chandigarh	1,222	44.07	15.79	1,179	43.96	15.49
Chhattisgarh	807	45.94	23.34	888	45.42	24.29
Daman Diu	639	53.51	19.82	617	54.81	21.53
Delhi	1,227	59.73	22.28	1,363	58.14	23.12
Goa	471	45.11	17.7	477	47.15	18.03
Gujarat	1,928	49.82	20.68	1,729	51.69	21.42
Haryana	1,431	49.40	21.27	1,767	48.66	20.63
Himachal Pradesh	1,141	51.78	20.23	1,283	52.31	20.08
Jammu Kashmir	1,427	58.42	23.25	1,354	58.39	23.87
Jharkhand	1,563	53.68	24.51	1,825	50.76	23.17
Karnataka	1,779	61.29	21.68	1,897	61.75	21.85
Kerala	1,198	48.28	18.33	1,646	47.76	17.23
Madhya Pradesh	907	58.73	22.35	838	58.64	23.56
Maharashtra	2,196	58.27	21.87	2,267	57.14	22.55
Meghalaya	1,076	51.04	19.95	1,352	50.68	19.4
Mizoram	1,469	43.97	15.28	1,408	43.93	14.57
Nagaland	638	54.41	22.47	732	52.80	23.67
Orissa	906	55.25	23.39	875	56.83	23.78
Puducherry	1,095	36.01	14.99	1,190	39.25	18.55
Punjab	1,337	55.49	20.87	1,299	55.02	20.25
Rajasthan	1,322	56.22	23.23	1,148	54.76	22.87
Sikkim	1,019	49.81	15.93	1,160	46.94	15.07
Tamil Nadu	1,858	65.15	20.9	2,004	65.74	21.01
Tripura	944	57.98	24.1	902	59.82	24.99
Uttar Pradesh	1,446	73.34	24.1	1,625	72.49	23.88
Uttarakhand	1,325	51.02	21.6	1,542	48.70	21.86
West Bengal	1,610	58.37	20.76	1,544	57.09	21.53

Table caption (top of table): **Table A-3.7: Gender wise average achievement on anchor items in Mathematics**

State or Union Territory	SC			ST			OBC			Other		
	N	Mean %	SD	N	Mean %	SD	N	Mean %	SD	N	Mean %	SD
A & N Islands	84	41.55	20.71	100	44.55	18.92	287	44.16	18.49	1,924	43.51	18.52
Andhra Pradesh	733	46.77	20.35	263	45.97	19.47	1,194	47.59	20.31	703	47.03	19.78
Assam	437	46.26	21.62	541	44.04	20.97	992	50.26	20.7	1,586	51.61	23.19
Bihar	371	46.91	23.11	116	44.61	24.79	1,332	48.99	23.85	768	52.05	23.54
Chandigarh	405	41.3	14.89	34	45.88	18.07	99	44.95	14.42	1,863	44.52	15.76
Chhattisgarh	290	44.19	21.92	486	43.84	25.24	756	48.33	23.87	163	41.44	21.4
Daman & Diu	55	51.73	21.41	213	48.64	21.51	858	56.34	20.27	130	49.73	19.35
Delhi	351	57.18	22.62	79	51.65	20.42	201	60.35	22.63	1,959	59.34	22.8
Goa	28	36.79	14.86	79	40.32	13.64	105	46.57	17.14	736	47.05	18.31
Gujarat	286	51.36	21.87	248	48.19	21.26	2,152	51.17	21.39	971	50.12	19.95
Haryana	1,201	47.35	20.81	127	49.02	21.33	901	50.51	21.74	969	49.61	20.09
Himachal Pradesh	754	50.34	19.44	124	53.63	18.16	336	48.66	20.16	1,210	53.91	20.57
Jammu & Kashmir	293	51.04	24.31	439	52.23	22.79	677	57.9	23.07	1,372	62.2	23.06
Jharkhand	460	49.79	23.56	613	46.91	23.49	1,532	55.6	23.91	783	50.7	23.09
Karnataka	820	62.53	21.86	433	61.35	20.71	1,529	60.77	22.69	894	61.99	20.51
Kerala	303	46.53	18.11	75	39	18.47	1,236	48.8	17.34	1,230	48.07	17.76
Madhya Pradesh	360	58.28	22.31	266	60.62	22.16	922	57.66	23.16	197	61.62	23.77
Maharashtra	710	56.1	22.09	660	56.72	21.82	1,145	59.62	22.12	1,948	57.48	22.4
Meghalaya	66	50.45	19.84	2,132	50.94	19.73	51	48.43	17.96	179	50.45	19.13
Mizoram	104	43.51	14.04	2,632	43.82	14.94	19	54.74	17.75	122	45.45	14.67
Nagaland	30	52.33	23.99	1,161	53.74	23.18	40	53.13	17.71	139	52.34	24
Orissa	366	51.02	23.06	331	51.07	23.35	516	57	22.73	568	61.25	23.63
Puducherry	636	36.1	15.95	1	15		1,334	38.56	17.54	314	37.32	16.57
Punjab	1,420	55.08	20.75	18	53.33	13.83	479	53.44	21.38	719	56.86	19.68
Rajasthan	602	50.34	24.08	356	50.97	22.18	1,096	57.74	22.62	416	61.19	21.29
Sikkim	149	47.89	15.71	883	46.55	14.58	833	48.99	15.17	314	51.5	18.25
Tamil Nadu	969	64.71	21.13	90	57.83	20.64	2,036	66.5	20.77	767	64.53	21.06
Tripura	437	58.92	23.86	515	55.58	25.08	320	58.02	24.31	574	62.29	24.33
Uttar Pradesh	653	73.28	25.03	47	74.57	20.27	1,585	72.28	23.64	786	73.68	23.99
Uttarakhand	927	48.62	22.16	118	46.4	23.98	320	46.16	21.89	1,502	51.51	21.15
West Bengal	780	56.5	20.9	184	51.68	19.89	301	56.06	20.97	1,889	59.11	21.26

Table A-3.8: Social groups wise average achievement on anchor items in Mathematics

PERFORMANCE IN ENVIRONMENTAL STUDIES

State or Union Territory	Distribution										
	0	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91 +
Andaman & Nicobar Islands	0.2	1.3	7.7	15.3	21.1	19.7	14.0	9.2	6.2	4.0	1.5
Andhra Pradesh	0.1	1.5	6.6	15.2	19.4	19.2	15.6	9.7	7.8	4.1	1.0
Assam	0.2	1.9	6.9	14.0	17.7	18.5	15.3	12.6	8.4	3.7	0.7
Bihar	0.8	4.5	10.4	16.4	14.9	14.3	10.7	9.8	9.3	6.6	2.4
Chandigarh	0.2	1.4	10.8	23.4	26.4	21.4	9.5	4.3	2.2	0.4	0.0
Chhattisgarh	3.4	12.5	6.9	13.4	15.7	14.7	6.5	8.5	8.3	6.9	3.4
Daman & Diu	0.0	1.3	6.3	13.1	16.2	13.3	10.4	12.1	17.2	10.0	0.2
Delhi	0.1	1.1	4.8	9.9	15.8	15.1	13.0	12.1	12.8	12.7	2.7
Goa	0.1	2.4	12.5	23.7	26.6	20.4	8.5	4.4	1.3	0.1	0.0
Gujarat	0.2	2.1	8.2	12.4	16.3	13.7	13.5	12.1	14.9	6.7	0.1
Haryana	0.5	2.8	9.5	19.6	20.1	16.7	11.3	7.4	7.7	3.9	0.6
Himachal Pradesh	0.3	1.2	7.3	14.4	19.0	17.7	14.3	10.2	7.0	4.3	4.5
Jammu & Kashmir	0.4	2.3	6.7	9.4	10.0	11.0	12.1	13.9	15.7	12.0	6.4
Jharkhand	0.5	4.2	8.8	13.6	16.1	12.4	10.7	10.2	9.1	11.1	3.5
Karnataka	0.0	0.5	2.9	5.5	8.4	9.9	12.4	13.8	17.0	18.0	11.6
Kerala	0.1	0.9	4.1	9.0	15.7	21.0	21.7	16.2	8.3	2.5	0.4
Madhya Pradesh	0.0	1.5	5.7	10.5	10.6	9.9	12.3	15.2	17.0	13.3	4.1
Maharashtra	0.1	1.0	4.2	9.4	13.3	15.9	13.8	12.9	11.2	12.8	5.4
Meghalaya	0.0	0.6	2.4	8.6	13.7	19.6	17.0	14.3	12.2	9.7	1.9
Mizoram	0.0	0.5	1.6	6.0	13.0	20.9	27.3	21.8	7.7	1.1	0.2
Nagaland	0.1	0.6	5.0	12.5	17.3	14.3	13.8	11.0	9.6	11.7	4.3
Orissa	0.3	2.5	7.9	9.5	12.6	13.9	13.1	16.3	14.9	6.6	2.3
Puducherry	0.0	2.0	10.9	18.7	24.3	20.3	13.7	6.0	1.5	1.3	1.3
Punjab	0.3	1.4	6.9	13.6	17.9	17.0	13.8	9.9	10.8	7.2	1.2
Rajasthan	0.2	2.2	8.5	14.6	14.5	12.5	12.7	12.7	10.2	10.2	1.7
Sikkim	0.0	1.4	2.1	7.1	17.6	26.4	24.0	14.1	6.0	1.2	0.1
Tamil Nadu	0.0	0.5	2.7	3.4	5.1	7.2	10.4	13.3	16.7	21.2	19.6
Tripura	0.4	3.1	4.1	9.3	13.4	12.0	13.8	16.2	13.5	11.3	2.8
Uttar Pradesh	0.3	1.1	3.5	4.3	7.2	9.4	11.5	14.5	17.2	20.1	10.9
Uttarakhand	0.5	3.6	8.9	14.8	15.9	14.8	12.8	13.0	8.3	5.6	2.0
West Bengal	0.0	0.5	2.9	7.4	12.7	15.5	16.5	17.0	13.7	10.0	4.0

Table A-3.9: Distribution of students on the basis of percent of score obtained on anchor items in EVS

State or Union Territory	Rural			Urban		
	N	Mean %	SD	N	Mean %	SD
A & N Islands	2,423	47.00	19.32			
Andhra Pradesh	2,208	48.45	19.57	693	46.30	18.05
Assam	3,351	48.14	19.53	316	52.28	19.40
Bihar	2,287	47.88	23.50	319	44.31	21.36
Chandigarh	882	38.35	14.08	1,566	39.36	14.95
Chhattisgarh	1,368	46.56	26.04	211	36.54	21.52
Daman & Diu	944	56.80	22.11	269	42.49	17.21
Delhi	405	54.54	21.08	1,890	56.47	22.31
Goa	493	35.07	14.10	417	40.40	14.27
Gujarat	3,132	51.42	21.01	530	49.15	23.43
Haryana	2,838	44.17	20.17	435	45.76	18.96
Himachal Pradesh	2,182	49.72	21.87	272	48.18	14.55
Jammu & Kashmir	2,638	58.80	24.11	203	53.89	24.70
Jharkhand	2,876	51.54	24.75	523	47.87	22.73
Karnataka	2,442	67.64	22.41	1,028	64.08	21.85
Kerala	2,225	51.43	17.26	445	52.44	16.19
Madhya Pradesh	1,505	57.75	22.66	359	63.47	24.78
Maharashtra	3,126	58.86	22.33	1,245	55.18	22.30
Meghalaya	1,816	57.46	20.39	716	53.85	16.80
Mizoram	1,628	53.80	14.21	1,247	54.83	14.97
Nagaland	1,118	57.25	22.85	246	44.19	17.58
Orissa	1,481	53.60	22.32	223	54.89	21.18
Puducherry	1,512	40.61	16.01	759	43.06	19.03
Punjab	1,977	51.29	21.28	452	47.46	19.65
Rajasthan	1,857	52.16	23.09	362	48.25	21.42
Sikkim	1,743	50.46	15.10	477	51.48	14.97
Tamil Nadu	2,643	73.06	21.64	1,135	70.52	22.02
Tripura	1,421	56.59	21.88	264	55.42	25.53
Uttar Pradesh	2,716	67.33	22.58	394	65.96	21.75
Uttarakhand	2,435	48.66	22.31	211	46.42	19.63
West Bengal	2,424	58.98	20.11	566	57.79	20.62

Table A-3.10: Area wise average achievement on anchor Items in EVS

Table A-3.11: Gender wise average achievement on anchor items in EVS						
State or Union Territory	**Boys**			**Girls**		
	N	**Mean %**	**SD**	**N**	**Mean %**	**SD**
Andaman & Nicobar Islands	1,232	45.69	18.82	1,191	48.36	19.75
Andhra Pradesh	1,372	48.52	19.33	1,529	47.41	19.14
Assam	1,761	48.39	19.49	1,906	48.59	19.62
Bihar	1,262	46.90	22.84	1,344	47.95	23.67
Chandigarh	1,249	39.40	14.71	1,199	38.59	14.58
Chhattisgarh	772	46.88	25.27	807	43.63	26.03
Daman & Diu	639	50.27	21.52	574	57.37	21.81
Delhi	1,143	57.09	22.03	1,152	55.17	22.15
Goa	445	36.19	14.51	465	38.77	14.23
Gujarat	1,925	50.66	20.96	1,737	51.57	21.85
Haryana	1,536	44.62	20.10	1,737	44.17	19.96
Himachal Pradesh	1,193	49.36	21.08	1,261	49.72	21.30
Jammu & Kashmir	1,432	58.90	24.07	1,409	57.98	24.30
Jharkhand	1,643	51.67	24.64	1,756	50.33	24.33
Karnataka	1,731	66.49	22.62	1,739	66.68	21.98
Kerala	1,122	51.85	17.12	1,548	51.41	17.07
Madhya Pradesh	932	58.18	22.78	932	59.52	23.58
Maharashtra	2,105	57.98	22.51	2,266	57.66	22.26
Meghalaya	1,074	55.66	19.37	1,458	57.02	19.60
Mizoram	1,468	54.67	14.89	1,407	53.81	14.19
Nagaland	637	55.35	21.97	727	54.50	23.06
Orissa	855	52.81	21.85	849	54.73	22.46
Puducherry	1,093	40.33	16.00	1,178	42.44	18.03
Punjab	1,227	50.75	21.23	1,202	50.40	20.85
Rajasthan	1,143	50.89	21.76	1,076	52.19	23.98
Sikkim	1,059	51.23	15.25	1,161	50.18	14.90
Tamil Nadu	1,776	72.39	21.69	2,002	72.22	21.88
Tripura	836	54.79	22.22	849	58.00	22.64
Uttar Pradesh	1,365	66.79	22.71	1,745	67.44	22.29
Uttarakhand	1,258	47.93	22.02	1,388	48.97	22.19
West Bengal	1,623	58.07	20.03	1,367	59.56	20.40

State or Union Territory	SC			ST			OBC			Other		
	N	Mean %	SD	N	Mean %	SD	N	Mean %	SD	N	Mean %	SD
A & N Islands	91	38.68	16.51	99	48.54	19.59	289	47.98	18.67	1,944	47.17	19.45
Andhra Pradesh	595	47.69	18.42	221	43.35	18.81	1,362	47.65	19.2	723	50.07	19.82
Assam	450	48.86	20.52	612	46.24	17.99	940	49.63	19.97	1,665	48.59	19.55
Bihar	436	45.78	20.98	111	46.8	23.93	1,393	47.43	23.58	666	48.67	23.93
Chandigarh	415	37.69	15.07	34	39.41	14.29	108	38.56	13.88	1,891	39.3	14.6
Chhattisgarh	253	47.92	24.78	382	40.88	27.68	787	47	24.75	157	42.48	25.52
Daman & Diu	53	50.57	22.09	212	53.56	21.89	818	53.96	21.83	130	52.88	22.75
Delhi	302	57.15	22.55	92	53.37	23.61	136	56.99	23.37	1,765	56.03	21.86
Goa	33	34.7	12.31	115	33.96	14.09	115	35.48	12.01	647	38.65	14.83
Gujarat	308	46.35	19.86	309	53.53	19.53	2,174	50.56	21.74	871	53.23	21.33
Haryana	1,175	43.12	19.82	175	46.29	21.41	972	43.66	19.86	951	46.31	20.03
Himachal Pradesh	772	48.32	22.37	162	50.28	21.69	292	46.75	20.47	1,228	50.89	20.43
Jammu & Kashmir	254	50.47	27.8	416	55.87	22.55	762	56.55	23.92	1,409	61.67	23.58
Jharkhand	422	50.92	25.78	643	46.23	21.72	1,582	53.18	25.06	752	50.43	24.19
Karnataka	819	64.94	23.07	368	72.47	21.36	1,433	66.31	22.23	850	66.09	21.68
Kerala	286	51.15	17.51	85	42.94	17.92	1,243	51.86	16.65	1,056	52.1	17.24
Madhya Pradesh	394	60.1	23.43	344	59.4	22.22	901	57.15	23.69	225	62.6	21.68
Maharashtra	628	58.81	23.05	736	54.22	21.86	1,028	58.01	21.29	1,979	58.73	22.79
Meghalaya	130	54.69	18.96	2,216	56.75	19.55	29	53.97	20.19	157	53.98	19.1
Mizoram	103	54.76	12.35	2,631	54.19	14.69	19	53.42	14.53	122	55.04	13.28
Nagaland	30	48.33	18.49	1,157	55.62	22.82	40	56.5	17.44	137	49.74	21.7
Orissa	344	47.08	22.25	316	52.71	21.6	493	56.6	21.9	551	56.02	21.82
Puducherry	630	40.61	16.29	1	35		1,327	42.05	18.07	313	40.46	14.3
Punjab	1,376	49.85	20.8	20	37	20.22	431	52.87	20.88	602	51.05	21.51
Rajasthan	539	46.78	23.26	349	50.77	21.64	980	54.09	23.45	351	52.38	20.56
Sikkim	149	48.59	15.24	849	50.22	14.52	841	50.28	15.23	381	53.43	15.59
Tamil Nadu	893	72.64	21.74	55	74.82	20.68	2043	72.19	21.76	787	72.01	22
Tripura	363	55.39	22.92	397	52.61	22	361	58.03	22.12	564	58.7	22.43
Uttar Pradesh	717	68.1	22.03	55	65.64	20.88	1,705	67.33	22.59	633	65.73	22.77
Uttarakhand	831	45.26	21.83	135	45.7	20.73	279	48.8	22.47	1,401	50.59	22.1
West Bengal	767	57.39	19.24	183	50	18.72	295	55.69	20.97	1,745	60.79	20.3

Table A–3.12: Social groups wise average achievement on anchor items in EVS

Appendix – IV

Item description with percent correct

	Table A-4.1: Item description with percent correct in Reading Comprehension	
Mental processes	**Question description**	**Percent correct**
Infer/evaluate	Use information to identify the main theme and evaluate the title	32
Grasp ideas/interpret	Identify relationship between a pronoun and the object/ person	33
Grasp ideas/interpret	Use information in the text to identify the remedy of a problem	39
Grasp ideas/interpret	Identify the causal relationship of two events	41
Grasp ideas/interpret	Identify relationship between an abstract idea and a concrete phenomenon	40
Grasp ideas/interpret	Grasp the relevant idea about the thinking of people from the text	40
Grasp ideas/interpret	Use information from a notice to conclude timing of an event	39
Locate	Identify the correct place name from those given in the notice	41
Locate	Use information from a table to determine the frequency of an event	41
Grasp ideas/interpret	Identify relationship between an object and its characteristics	44
Grasp ideas/interpret	Determine the sequence of activities in a process	43
Grasp ideas/interpret	Use information in the story to identify the cause of an event	46
Grasp ideas/interpret	Use information in the story to grasp the problem	46
Grasp ideas/interpret	Use information in the story to determine the cause of an event	47
Grasp ideas/interpret	Use information from the notice to derive the duration of an event	49
Locate	Use information from a table to determine the frequency of an event	50
Infer/evaluate	Make complex inference about the quality of persons from their activities	50
Infer/evaluate	Use information in the text to make inference about the cause of an act	51
Infer/ evaluate	Make complex inference about the effect of an activity on concerned persons	50
Grasp ideas/ interpret	Use information to draw a simple conclusion about the usefulness of an object	51
Grasp ideas/ interpret	Use information in the text to identify the ingredients of an object	52
Locate	Use information in a table to identify the most frequent event	52
infer/evaluate	Use information in the text to infer the cause of an event	52
Locate	Recognise appropriate information about the action to be taken by a person	54
infer/evaluate	Use information in a story to make a simple inference about the cause of an act	59
Infer/evaluate	Use information from a notice to make a simple inference about participation in a sport	58
Infer/evaluate	Use information in a story to make a simple inference about the cause of an act	60
Grasp ideas/ interpret	Recognise the text type as a notice from the format and the content	63
Locate	Use information in a table to identify the time for a phenomenon	68
Locate	Use information in a table to identify phenomena occurring at a particular time	71

Mental processes	Question description	Percent correct
	Table A–4.2: Item description with percent correct in Mathematics	
Applying	**Addition of two fractions**	**26**
Reasoning	Calculate the perimeter of squares *	35
Reasoning	Calculate the difference between two decimal numbers*	34
Reasoning	Identify smallest number divisible by two single digit numbers	34
Applying	Identify the difference between fractions	34
Reasoning	Can subtract distance given in different units	35
Reasoning	Find the difference between numbers after changing position of digits*	39
Reasoning	Solve money problems involving fractions	38
Reasoning	Solve an equation with one unknown	38
Reasoning	**Calculate an average of given values**	**40**
Applying	Calculate the radius of a circle from given information *	43
Applying	Calculate the perimeter of a square of a given side	44
Applying	Identify the largest number made from given three digits*	44
Applying	Calculate the difference described in word problem*	45
Applying	Able to convert minutes into hours	45
Applying	Find the difference between two large numbers	46
Applying	Identify the smallest angle in a given figure	47
Applying	Select appropriate units for measuring length	48
Applying	**Identify 45º as 'half of a right angle'**	**49**
Applying	Calculate the area of a rectangle	50
Applying	Calculate the period between two given times	50
Applying	Find the difference between two digits in a number	51
Applying	Calculate the number of hours in a week	52
Applying	Multiply two digit numbers	54
Knowing	Find the angle between the hands of a clock	54
Applying	Solve the word problem	57
Applying	Multiply two given numbers	58
Knowing	Convert volume of liquid into different units	60
Knowing	Find the place value of a digit in given number*	61
Applying	Calculate time period from a given clock	67
Knowing	Identify the rectangle among given shapes*	67
Applying	Understand the conversion of metres and centimetres	69
Applying	Add two four digit numbers*	76
Knowing	Identify the triangle among given shapes	84

Mental processes	Question description	Percent correct
	Table A-4.3: Item description with percent correct in EVS	
Applying	Understand the phenomena of lunar eclipse	30
Knowing	Know the importance of forests in human life	34
Reasoning	Establish the relationship between a measuring apparatus and the quantity of water	26
Applying	Find the effect of exhaled air on a mirror	35
Knowing	Know the sources of energy and their by products	35
Knowing	Know the components of food / diet and their functions	40
Applying	Understand the process of breathing	41
Applying	Find out the least polluting fuel on the basis of their combustion	41
Applying	Establish the relationship between wind strength and a flag's position	42
Applying	Reasons out the importance of wild animals in the eco system	41
Applying	Identify the stages of seed germination	44
Reasoning	Reasons out to find directions in the map	44
Knowing	Know about the neighbouring countries of India	45
Knowing	Know the edible part of a carrot	48
Applying	Interpret the graph to find out heartbeats of the mouse	48
Reasoning	Explain the reason behind the construction of dams	49
Reasoning	Analyse the family tree and find solutions	50
Applying	Interpret the graph to find out the rainfall on Wednesday	50
Reasoning	Find out the trend of growth in a plant	51
Applying	Identify the location of Jim Corbett Park in the map	54
Reasoning	Understand the family tree and interpret the relationship	54
Knowing	Know the animal source of food	54
Reasoning	Establish relationships on the basis of a family tree	57
Knowing	Know the sources of water and their usage	58
Reasoning	Relate different types of clothes with their properties	60
Applying	Interpret the graph to identify the animal that has the lowest heartbeats.	60
Applying	Apply knowledge to find the direction in a map	59
Knowing	Know the suitable conditions for breeding of mosquitoes	63
Reasoning	Find out the solution for a patient when a doctor is not available	66
Applying	Compare the means of transportation that causes pollution	66
Applying	Interpret the graph to find out the day with the highest rainfall	68
Knowing	Know the national game of India	68
Knowing	Know the properties of solutes and solvents	71
Knowing	Know the name of the disease spread by mosquitoes	77
Applying	Classify the group of domestic animals	79
Knowing	Recognise birds on the basis of their features	81

Appendix – V

Socioeconomic Index

Home and circumstances are a crucial factor in the development of intellectual abilities. These can include personal characteristics such as gender and geographical region and social labels such as caste that affect the way a young person's abilities may progress. It is also true worldwide, that socioeconomic circumstances have a major effect on the success of individuals in the education system (OECD, 2010). In this report, an Index of Socio-Economic situation is used extensively, especially where looking at the relation between background factors and the outcome. It is derived from a combination of such background factors and the means of construction is described in this Appendix.

Index of Parental Education

The categories collected for parental education (mother's or father's) in NAS were

Table A–5.1: Parental education		
Level	Father	Mother
Illiterate (not able to read and write)	18.4	30.6
Literate (no formal schooling, can read or write)	13.2	13.5
Primary	23.8	21.3
Secondary	21.2	15.2
Higher Secondary	10	5.3
Degree and above	4.6	2.5
Do not know	3.4	3.2
Not applicable	0.7	0.5
Missing	4.6	7.7
Total	100	100

How does one define equidistance of categories? Since the outcomes of the NAS studies are achievement scale scores, there is a case for defining this in terms of a linear or near-linear relation with one of the scale scores. One scale score, namely Language, is considered here in this process.

Figure A-5.1 shows the means of Mathematics scale scores by the categories of Father's and Mother's education.

Figure A–5.1: Parental education and Language score
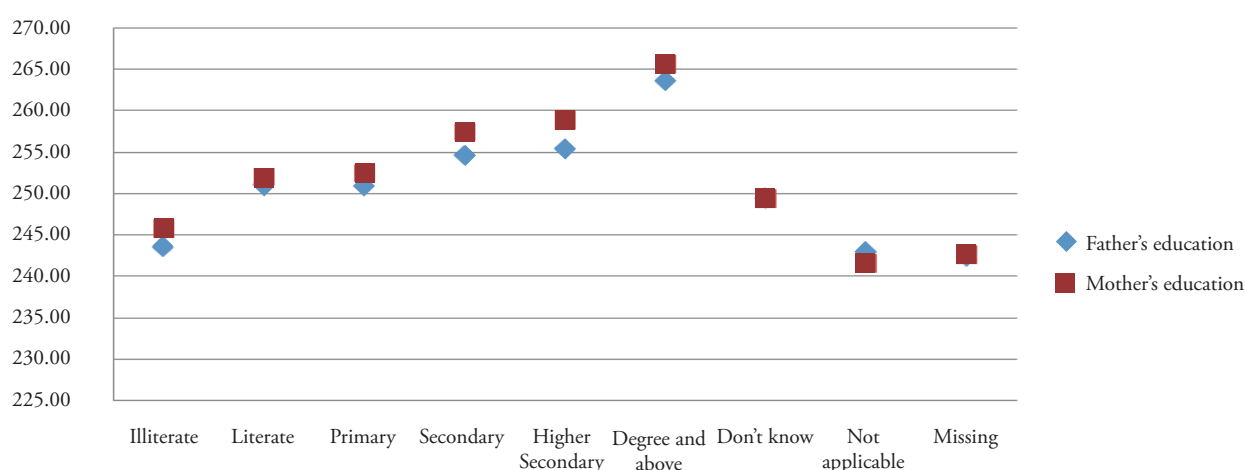
Discounting the last three categories on the right which have all kinds of missing data, the score means increase monotonically as the category number increases. There is little difference in the outcome for Literate and Primary, so the linearity of the relationship can be improved by combining category 2 (Literate) with category 3 (Primary School). The proportion of missing values is small (in the neighbourhood of 10% in total), but it seems intuitively at least reasonable to combine 'Don't Know' with the largest category (Literate/ Primary) and put Not Applicable equal to No Education. As in PISA, the higher of the two parental education categories is then taken as the indicator of parental education. Figure A-5.2 shows the result of these manipulations by comparing mean scores for the six resulting categories.

Figure A–5.2: Language score and higher parent education
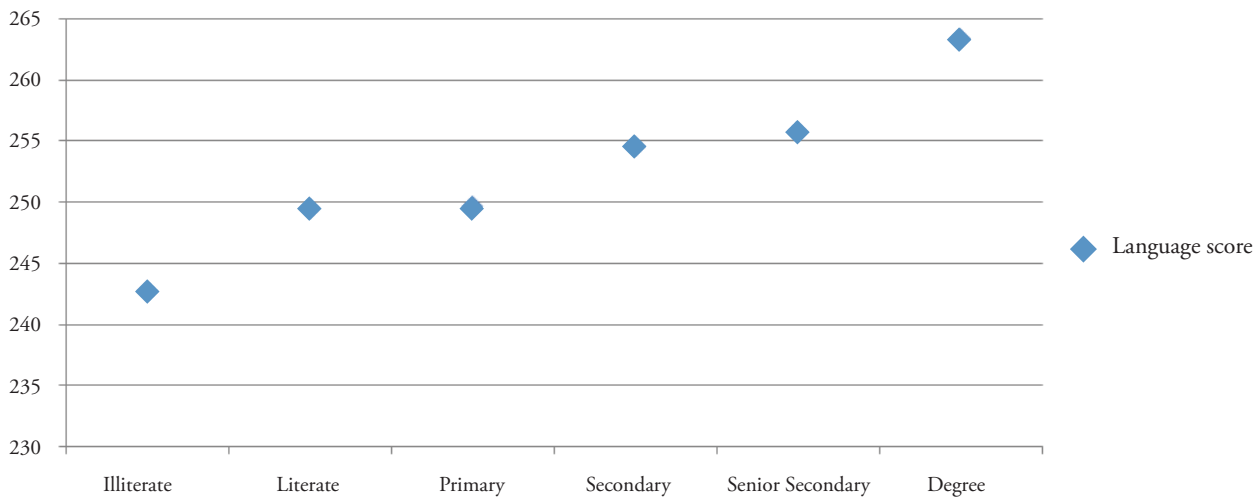
There is little difference in the outcome for Literate and Primary and so these are combined as shown in Figure A-5.3.

Figure A–5.3: Language score and higher parent education
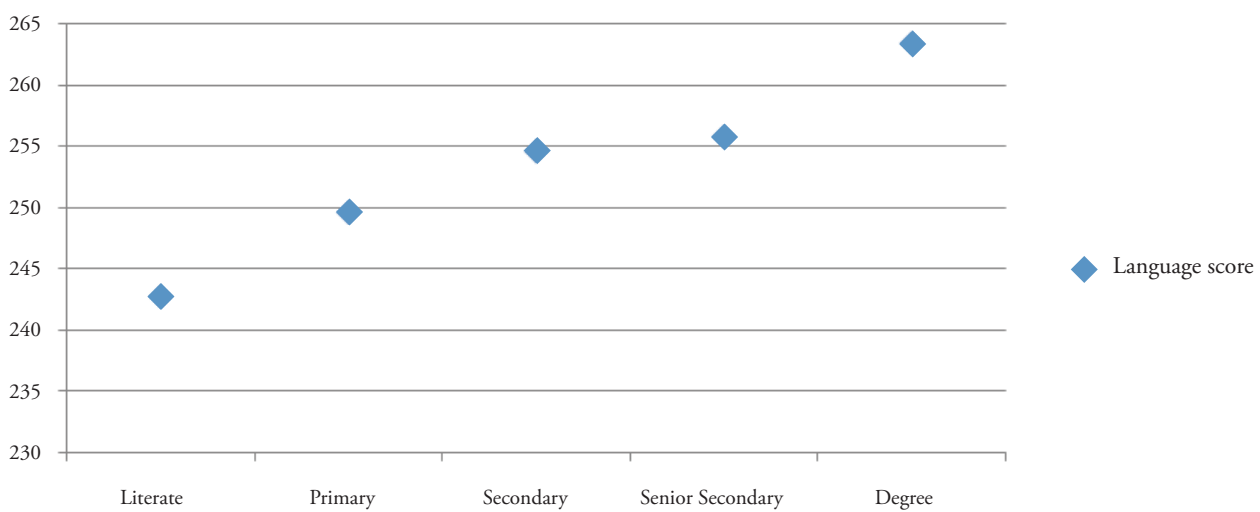
Index of Parental Occupation

A similar process is undertaken for parental occupation. Table A-4.2 shows the total number in each category.

Level	Father		Mother	
	N	**%**	**N**	**%**
Unemployed	11,051	9.4	12,575	10.7
Housewife	3,729	3.2	68,176	57.9
Agri labourer/ servant/ daily wager/ street vendor	38,894	33.1	14,681	12.5
Farmer	24,302	20.7	6,021	5.1
Skilled or office worker	14,064	12	2,465	2.1
Shopkeeper or businessman	12,175	10.3	1,517	1.3
Teacher or professor	2,042	1.7	1,082	0.9
Manager or professional	1,432	1.2	226	2
Don't know	1,459	1.2	635	0.5
NA	1,860	1.6	532	0.5
Total valid	1,11,008	94.4	1,07,910	91.7
Missing	6,645	5.6	9,743	8.3
Total	**1,17,653**	**100**	**1,17,653 7653**	**100**

Table A-5.2: Parental occupation

Figure A-5.4 shows the results for mean Language score against Father's and Mother's occupation. The result for male Housewives is somewhat surprising in an Indian context, and these respondents have been grouped together with the Unemployed group. Among Father's occupation, the trend is monotonic for the non-missing categories, except for the Manager/ Professional category. In further analyses, these respondents have been grouped with the Teacher/ Professor category. The two missing categories have been grouped with the largest category (3=Agricultural labourer etc.,), to which they mostly correspond in any case in attainment. In the final combination, the parental occupation whichever is higher, that of the father or the mother is taken, with the exception that the category Housewife is not included in this process.

Figure A-5.4: Mean student language score and parental occupation
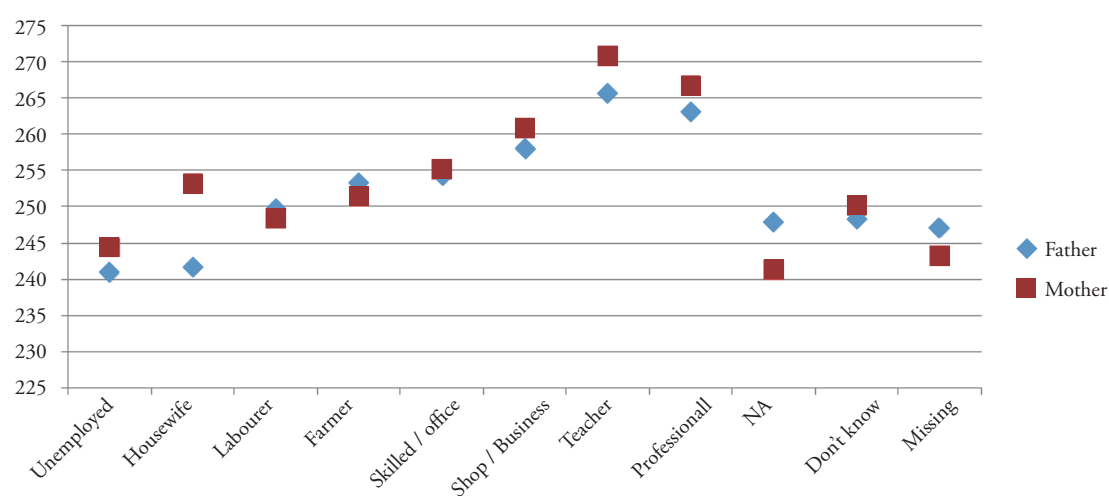
Figure A-5.5 shows the final result. This is not quite so linear as in the result for education, perhaps not surprisingly, but it is at least monotonic.

Figure A-5.5: Higher parent occupation and mean Language score
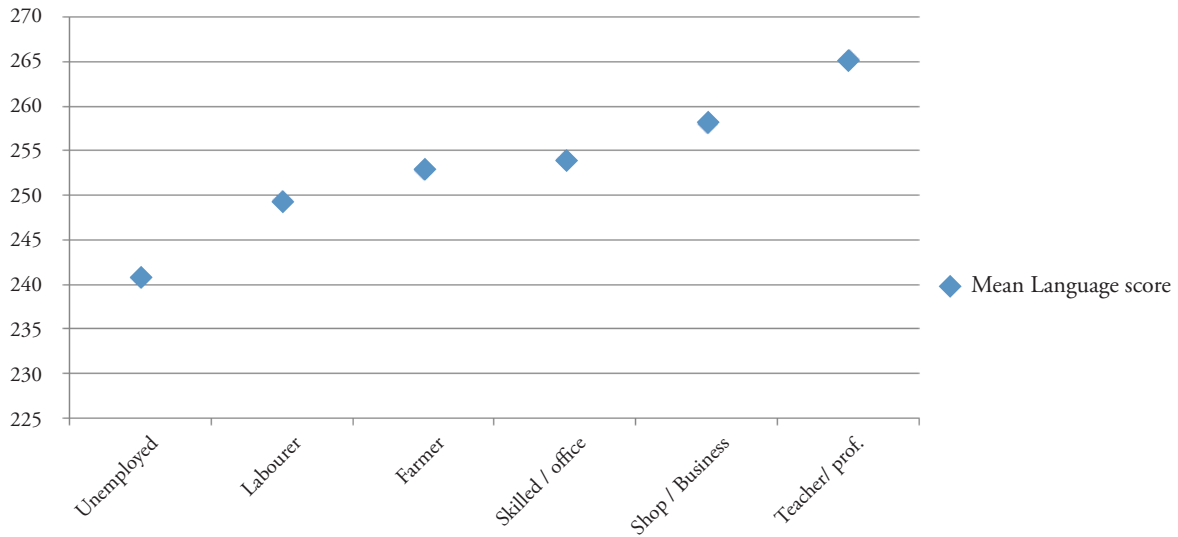
The third element of the socio-economic index comes from the Number of Possessions index. As its title suggests, this is simply the number of possessions owned by the pupil's family, from a list in the pupil questionnaire. These are: calculator, computer, study desk, dictionary, internet connection, daily newspaper and magazine. The elements computer and internet connection are not included in the construction of this index as preliminary analyses have shown them to be negatively related to attainment.

The mean test score in Language is shown graphed against the number of possessions in Figure A-5.6. It shows that the relationship between the two is very close to linear.

Figure A-5.6: Language score and number of possessions
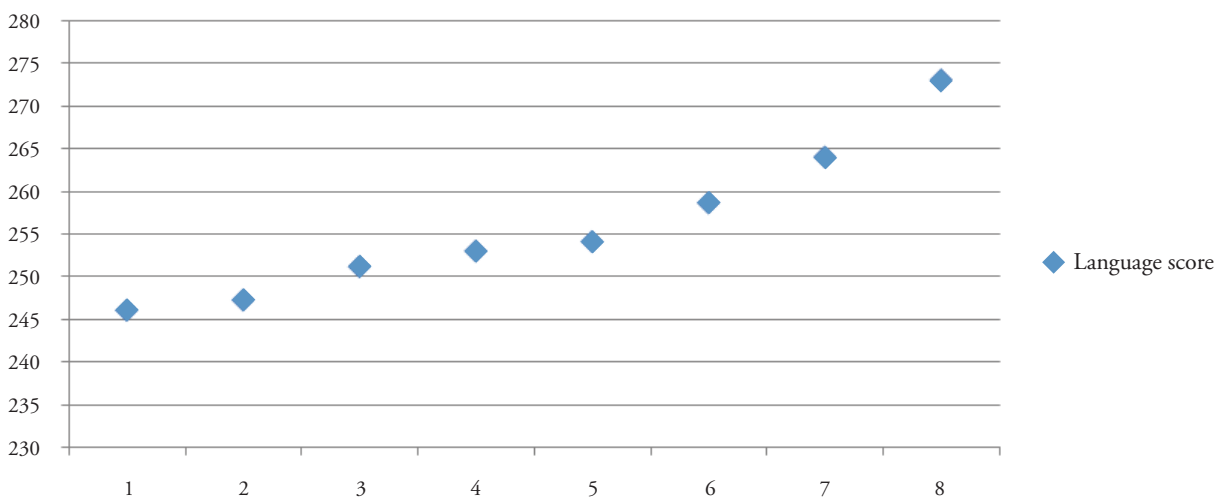
Response rates for the three variables Parental Education, Parental Occupation and Number of Possessions are shown in Table A-5.3

Table A-5.3: Response rates for constituent variables

Variable	Response rate
Parental education	97.4
Parental occupation	95.4
Number of possessions	92.6

These were already high, but in order to increase the coverage further, missing values on any of the three variables in turn were replaced by a prediction based on regression on the other two.

Finally a principal components analysis of the three variables was undertaken and the first principal component, which accounted for approximately half of the total variation, was taken as the socioeconomic indicator.

Note: A similar procedure was used to create the socio economic status for Mathematics and EVS.

Appendix – VI

Variance Components

Variance Components: Language

This looked at the proportion of the variance in the Language scale score that can be accounted for by pupil and school characteristics derived from the school and pupil background questionnaires. Variables have been selected in the light of the results of the regression analyses already carried out, firstly with predictor variable taken singly, and then after including the 'key' variable, in this case, the socio-economic status and speaks the language of instruction at home. There are a very large number of possible candidate variables and in some instances, cognate variables have been grouped together to form scales.

The predictor variables have been grouped into categories, as follows:

From Pupil questionnaire.
Group 1. Home and personal characteristics
Socio-economic scale
Speak instruction language at home
Gender
Category
Number of siblings
Physically challenged
Transport to school
Absent in the last month
Group 2. School-related home factors
Use of school computer
Use of school library
Given homework
Help with homework at home
Child has a tutor
Homework checked at home
Homework checked at school
Language textbook
Learning oriented home activities
Group 3 Non-school home factors
Other out-of-school activities
Domestic chores
Group 4. Attitudes etc.,
Likes school
Bad things happen at school
Scale of language attitude items

Group 5. Teaching practices
Reading activities in class

From school questionnaire
Group 5. Resources.
Number of types of equipment
Ratio pupils/computer
Internet access
Communication technology help
Lack of resources
Difficulty filling teacher vacancies
Group 6. Structure
Administration
Preschool attached
Proportion male teachers
Proportion girls
Days/year
Days/week
Education committee
PTA
Under SSA
Group 7. Activities of the Principal
Administration
Group 8. Accountability
Frequency of testing
Teacher evaluation
Inspected
Group 9. School composition and pupil attitudes/behaviour.
Pupil composition
Pupil behaviour problems
Group 10. Parents
Qualities of parents
Group 11. Incentives
Some incentive scheme in place

Procedures for dealing with omitted data

The large number of variables involved has led to problems in another way. Response rates for individual variables are high, typically in the region of 85-90%. However, after excluding cases on the standard list wise basis and attempting to include all the above variables as regression predictors, the effect on the sample size is extreme. Including all the 'pupil' variables above reduces the effective sample size by nearly half, from 72,205 to 38,164 and including 'school' variables reduces sample size to 2,444, while including both, reduces it still further to 1,033.

For this reason, it was decided that some kind of non-response adjustment process was required. A regression approach was used. The procedure differed somewhat between 'pupil' and 'school' variables. 'Pupil' variables were predicted by regression from the other variables in the thematic group. Because of the extreme effect of non-response among the 'school' variables, the regression was carried out on the variables collected from pupils relating to their school. After running these regressions, missing values were imputed using the relevant regression predictions. After this procedure, even after including all relevant variables, the sample size was 58,875, i.e., over 80% of the original sample.

Variance components: Language

Table A-6.1 shows the contributions of the various variable groupings when introduced sequentially as a proportion of the total variation.

Table A–6.1: Language: contributions to variance		
Variable group	**R–Sq**	**R–Sq Increase**
Home and personal characteristics	0.038	0.038
School–related home inputs	0.048	0.011
Non–school home activities	0.048	0.000
Attitudes etc.,	0.054	0.006
Reading activities in class	0.057	0.003
School resources	0.060	0.003
School structure	0.068	0.008
Activities of the Principal	0.068	0.000
Accountability	0.069	0.001
School composition and atmosphere	0.070	0.001
Parents	0.070	0.000
Incentives	0.071	0.001

Conclusions

The first grouping (home and personal characteristics) accounts for more than half the total rather disappointing proportion of variance explained of 0.071, i.e., slightly over 7%. Other relatively large contributors are school-related home inputs, mainly homework-related), pupil attitudes, and school structure (e.g., governance and composition of staff and pupils). It is important to remember that an apparently small contribution does not necessarily mean that a given input area has relatively little impact; it could be that the items which it was possible to measure were not the most important aspect of the area.

Appendix – VII

Student Related Variables

Table A-7.1: Gender wise distribution of students			
State or Union Territory	**Boy**	**Girl**	**Total N**
	% (SE)	**% (SE)**	
A & N Islands	50 (1.2)	50 (1.2)	2,439
Andhra Pradesh	47 (1.0)	53 (1.0)	4,357
Assam	49 (0.9)	51 (0.9)	5,473
Bihar	52 (1.1)	48 (1.1)	3,943
Chandigarh	53 (1.3)	47 (1.3)	2,462
Chhattisgarh	50 (1.5)	50 (1.5)	2,543
Daman & Diu	49 (10.4)	51 (10.4)	1,286
Delhi	48 (3.3)	52 (3.3)	3,764
Goa	48 (2.8)	52 (2.8)	1,437
Gujarat	51 (1.8)	49 (1.8)	5,502
Haryana	47 (1.8)	53 (1.8)	4,846
Himachal Pradesh	47 (0.8)	53 (0.8)	3,830
Jammu & Kashmir	49 (1.1)	51 (1.1)	4,212
Jharkhand	49 (1.3)	51 (1.3)	5,246
Karnataka	50 (1.2)	50 (1.2)	5,359
Kerala	42 (1.1)	58 (1.1)	4,161
Madhya Pradesh	51 (2.0)	49 (2.0)	2,687
Maharashtra	49 (1.0)	51 (1.0)	6,701
Meghalaya	44 (1.4)	56 (1.4)	3,767
Mizoram	52 (1.2)	48 (1.2)	2,897
Nagaland	48 (1.3)	52 (1.3)	1,565
Orissa	49 (1.2)	51 (1.2)	2,665
Puducherry	48 (2.2)	52 (2.2)	2,287
Punjab	51 (1.2)	49 (1.2)	3,914
Rajasthan	51 (1.2)	49 (1.2)	3,518
Sikkim	47 (1.4)	53 (1.4)	3,330
Tamil Nadu	48 (1.0)	52 (1.0)	5,776
Tripura	51 (1.4)	49 (1.4)	2,727
Uttar Pradesh	46 (1.0)	54 (1.0)	4,721
Uttarakhand	47 (1.0)	53 (1.0)	4,212
West Bengal	53 (2.3)	47 (2.3)	4,539
Overall average	**49 (0.3)**	**51 (0.3)**	**1,16,166**

Table A-7.2: State wise highest level of education of either parents						
State or Union Territory	**Illiterate**	**Literate or Primary**	**Secondary/ Higher Secondary**	**Degree & above**	**Do not know/ Not Applicable**	**Total (N)**
	% (SE)	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**	
A & N Islands	11 (1.5)	26 (1.8)	51 (2.1)	7 (1.5)	5 (1.2)	2,389
Andhra Pradesh	28 (1.3)	43 (1.4)	21 (1.0)	3 (0.4)	5 (0.6)	4,354
Assam	13 (0.9)	39 (1.4)	36 (1.4)	5 (0.4)	7 (0.7)	5,297
Bihar	23 (1.2)	35 (1.4)	30 (1.5)	8 (0.8)	4 (0.5)	3,787
Chandigarh	10 (1.3)	21 (2.5)	51 (2.3)	10 (1.4)	8 (1.5)	2,459
Chhattisgarh	19 (1.1)	40 (1.5)	33 (1.3)	4 (0.7)	3 (0.5)	2,517
Daman & Diu	8 (3.1)	43 (4.3)	38 (3.1)	5 (0.9)	6 (1.8)	1,280
Delhi	11 (0.9)	31 (1.6)	41 (1.7)	7 (0.8)	10 (1.3)	3,711
Goa	7 (1.2)	23 (2.4)	45 (2.7)	19 (2.7)	5 (0.8)	1,411
Gujarat	13 (1.0)	54 (1.4)	26 (1.3)	4 (0.5)	3 (0.4)	5,526
Haryana	22 (1.1)	32 (1.2)	38 (1.5)	3 (0.4)	5 (0.5)	4,801
Himachal Pradesh	8 (1.0)	21 (1.2)	59 (1.6)	5 (0.5)	8 (1.0)	3,774
Jammu & Kashmir	33 (1.1)	33 (1.1)	29 (1.2)	2 (0.4)	3 (0.4)	4,180
Jharkhand	22 (1.1)	40 (1.2)	27 (1.2)	8 (0.7)	3 (0.5)	5,061
Karnataka	23 (1.2)	44 (1.3)	25 (1.2)	4 (0.5)	4 (0.5)	5,203
Kerala	1 (0.2)	34 (1.5)	49 (1.4)	10 (0.8)	7 (0.9)	4,164
Madhya Pradesh	23 (1.6)	35 (1.6)	35 (1.6)	3 (0.4)	4 (0.8)	2,701
Maharashtra	14 (0.8)	37 (1.3)	39 (1.2)	8 (0.7)	2 (0.4)	6,561
Meghalaya	9 (0.9)	40 (1.5)	30 (1.4)	8 (0.8)	12 (1.1)	3,671
Mizoram	2 (0.5)	33 (1.5)	46 (1.5)	6 (0.7)	13 (1.3)	2,869
Nagaland	15 (1.6)	47 (2.6)	27 (2.3)	4 (1.0)	7 (1.6)	1,501
Orissa	15 (1.3)	27 (1.6)	35 (1.8)	8 (1.0)	15 (1.3)	2,543
Puducherry	7 (0.8)	26 (1.6)	59 (2.2)	2 (0.4)	6 (1.4)	2,293
Punjab	21 (1.3)	40 (1.2)	34 (1.4)	2 (0.5)	3 (0.4)	3,905
Rajasthan	29 (1.4)	47 (1.5)	18 (1.1)	4 (0.5)	2 (0.4)	3,459
Sikkim	10 (0.9)	47 (1.8)	31 (1.3)	3 (0.5)	9 (1.2)	3,302
Tamil Nadu	8 (0.6)	30 (0.9)	58 (1.2)	3 (0.3)	2 (0.3)	5,766
Tripura	11 (1.0)	54 (1.7)	22 (1.3)	6 (0.8)	7 (0.8)	2,718
Uttar Pradesh	22 (1.4)	42 (1.6)	27 (1.2)	5 (0.7)	3 (0.5)	4,646
Uttarakhand	15 (1.1)	44 (1.7)	34 (1.4)	3 (0.5)	3 (0.5)	4,134
West Bengal	7 (0.6)	35 (1.6)	35 (1.3)	11 (0.9)	12 (1.0)	4,606
Overall average	**15 (0.2)**	**38 (0.3)**	**36 (0.3)**	**6 (0.1)**	**5 (0.1)**	**1,14,589**

State or Union Territory	Illiterate		Literate & Primary		Secondary & Higher Secondary		Degree & above	
	Average achievement	SE of Mean	Average achievement	SE of Mean	Average achievement	SE of Mean	Average achievement	SE of Mean
A & N Islands	228	2.4	235	1.9	234	1.2	233	3.1
Andhra Pradesh	240	1.5	245	1.3	249	1.9	254	5.3
Assam	227	2.0	236	1.3	246	1.4	255	4.0
Bihar	222	1.8	229	1.6	234	1.8	235	3.1
Chandigarh	242	2.7	240	1.8	246	1.2	254	2.9
Chhattisgarh	216	2.8	226	1.9	239	2.3	257	7.4
Delhi	253	3.1	256	1.9	259	1.6	270	4.0
Goa	239	5.1	240	2.5	260	2.0	284	3.7
Gujarat	250	2.3	251	1.0	251	1.4	258	4.0
Haryana	226	1.7	236	1.5	241	1.3	251	4.4
Himachal Pradesh	233	3.4	233	2.2	245	1.3	249	4.2
Jammu & Kashmir	247	1.6	248	1.8	257	1.9	257	9.2
Jharkhand	230	2.0	238	1.6	240	1.9	245	3.7
Karnataka	259	1.7	263	1.3	264	1.7	274	4.6
Kerala	242	12.8	275	1.6	274	1.3	293	2.7
Madhya Pradesh	247	2.4	251	2.2	252	2.2	274	6.7
Maharashtra	258	2.1	262	1.2	273	1.1	276	2.6
Meghalaya	243	2.9	251	1.5	255	1.6	251	2.9
Mizoram	238	4.6	256	1.3	262	1.1	274	3.0
Nagaland	237	3.7	250	2.2	250	2.8	243	6.6
Orissa	232	3.3	251	2.4	260	2.1	281	5.0
Puducherry	217	2.7	215	1.4	226	1.1	230	5.7
Punjab	244	2.0	253	1.5	263	1.7	256	6.5
Rajasthan	247	1.9	253	1.5	255	2.7	255	5.7
Sikkim	237	2.1	243	1.1	252	1.3	247	5.5
Tamil Nadu	275	3.0	275	1.6	281	1.1	282	5.4
Tripura	249	3.4	249	1.6	263	2.5	256	4.8
Uttar Pradesh	284	2.3	281	1.7	286	2.0	287	4.4
Uttarakhand	226	2.6	233	1.5	235	1.6	239	4.5
West Bengal	243	3.1	260	1.4	270	1.5	291	2.7
Overall average	**243**	**0.5**	**250**	**0.3**	**255**	**0.3**	**263**	**0.8**

State or Union Territory	Illiterate		Literate & Primary		Secondary & Higher Secondary		Degree & above	
	Average achievement	SE of Mean	Average achievement	SE of Mean	Average achievement	SE of Mean	Average achievement	SE of Mean
Andaman & Nicobar Islands	225	2.4	227	1.7	226	1.1	227	2.7
Andhra Pradesh	229	1.4	241	1.2	244	1.7	256	5.9
Assam	233	2.2	238	1.3	245	1.4	248	4.4
Bihar	235	2.2	245	1.9	248	2	249	3.5
Chandigarh	230	2.3	228	1.5	228	1	231	2.1
Chhattisgarh	217	3.2	225	2.3	235	2.3	252	5.1
Delhi	254	2.8	257	1.7	265	1.5	263	3.8
Goa	223	3.4	227	2.5	241	1.8	261	3.1
Gujarat	259	2.2	257	1.1	256	1.6	253	3.4
Haryana	237	1.9	238	1.4	244	1.3	255	4.5
Himachal Pradesh	237	2.9	237	1.8	247	1.1	250	4.2
Jammu & Kashmir	260	1.7	261	1.7	272	2	245	8
Jharkhand	239	2.1	253	1.5	248	1.7	251	3.6
Karnataka	267	1.7	268	1.2	272	1.6	288	3.8
Kerala	223	6.7	242	1.2	243	0.9	252	2.4
Madhya Pradesh	265	2.8	263	2	266	1.9	289	6
Maharashtra	259	2.2	263	1.3	267	1.2	267	3
Meghalaya	240	3	250	1.4	246	1.6	236	2.8
Mizoram	219	3.8	231	0.9	233	0.8	240	2.4
Nagaland	247	3.4	256	2.1	247	2.6	247	7
Orissa	241	3.2	257	2.5	265	2.2	281	4.3
Puducherry	214	2.8	210	1.4	220	1.1	216	4.5
Punjab	250	2.2	251	1.4	257	1.5	249	5.4
Rajasthan	247	1.8	261	1.5	260	2.5	263	5.1
Sikkim	232	2	233	0.9	238	1.2	242	5.5
Tamil Nadu	272	2.7	276	1.4	282	1	281	4.2
Tripura	249	3.7	260	1.9	273	2.8	253	6.3
Uttar Pradesh	300	2.2	298	1.8	299	2.1	303	4.7
Uttarakhand	238	2.4	242	1.3	240	1.5	232	4.8
West Bengal	249	3.2	260	1.4	267	1.4	291	2.6
Overall Average	**248**	**0.5**	**252**	**0.3**	**252**	**0.3**	**258**	**0.8**

Table A-7.4: Students achievement in Mathematics with relation to parents' highest level of education

State or Union Territory	Illiterate		Literate & Primary		Secondary & Higher Secondary		Degree & Above	
	Average achievement	SE of Mean	Average achievement	SE of Mean	Average achievement	SE of Mean	Average achievement	SE of Mean
Andaman & Nicobar Islands	232	2.7	232	1.9	234	1.2	233	2.8
Andhra Pradesh	235	1.4	239	1.1	240	1.7	252	4.9
Assam	230	1.9	237	1.2	244	1.3	249	3.3
Bihar	223	2.2	238	1.8	243	2.0	239	3.8
Chandigarh	230	2.1	226	1.4	224	0.9	229	2.4
Chhattisgarh	213	3.2	229	2.2	240	2.5	247	5.2
Delhi	259	2.8	261	1.9	263	1.7	263	4.3
Goa	219	4.3	223	2.2	234	1.6	259	3.1
Gujarat	248	2.1	250	1.1	254	1.6	251	4.1
Haryana	226	1.6	229	1.3	238	1.3	245	4.7
Himachal Pradesh	235	3.2	239	2.0	246	1.3	251	4.4
Jammu & Kashmir	261	1.8	254	1.8	264	2.0	239	7.1
Jharkhand	240	2.1	247	1.6	245	1.8	250	3.6
Karnataka	273	2.0	277	1.3	276	1.6	293	5.0
Kerala	224	6.8	251	1.2	251	1.0	263	2.1
Madhya Pradesh	262	2.7	268	2.0	266	2.1	292	7.3
Maharashtra	257	2.1	262	1.3	268	1.2	263	2.6
Meghalaya	250	3.1	258	1.5	261	1.8	257	2.9
Mizoram	230	4.7	252	1.0	256	0.9	263	2.4
Nagaland	245	3.5	258	2.1	254	2.7	237	6.2
Orissa	236	3.4	251	2.7	267	2.1	273	4.4
Puducherry	217	2.7	215	1.4	224	1.0	225	4.6
Punjab	237	1.9	248	1.6	251	1.6	261	7.4
Rajasthan	241	2.0	253	1.6	248	2.6	243	5.5
Sikkim	243	2.2	243	0.9	249	1.3	242	4.9
Tamil Nadu	286	3.3	284	1.6	290	1.1	291	4.9
Tripura	254	4.4	256	1.7	264	2.6	261	6.8
Uttar Pradesh	284	2.2	284	1.6	283	1.9	277	4.7
Uttarakhand	235	2.5	236	1.4	241	1.5	248	5.0
West Bengal	246	3.0	262	1.4	269	1.3	281	2.4
Overall Average	**246**	**0.5**	**251**	**0.3**	**254**	**0.3**	**257**	**0.8**

Table A-7.5: Students achievement in EVS related to parents' highest level of education

	Table A-7.6: Availability of computers in schools		
State or Union Territory	**Yes**	**No**	**Total (N)**
	% (SE)	**% (SE)**	
A & N Islands	69 (5.4)	31 (5.4)	2,408
Andhra Pradesh	21 (2.0)	79 (2.0)	4,244
Assam	31 (2.7)	69 (2.7)	5,057
Bihar	8 (1.2)	92 (1.2)	3,704
Chandigarh	94 (2.2)	6 (1.2)	2,462
Chhattisgarh	6 (1.2)	94 (1.2)	2,518
Delhi	81 (2.7)	19 (2.7)	3,766
Goa	90 (3.5)	10 (3.5)	1,429
Gujarat	65 (2.7)	35 (2.7)	5,234
Haryana	17 (2.2)	83 (2.2)	4,816
Himachal Pradesh	9 (1.4)	91 (1.4)	3,765
Jammu & Kashmir	16 (1.6)	84 (1.6)	4,171
Jharkhand	24 (2.4)	76 (2.4)	5,010
Karnataka	35 (3.1)	65 (3.1)	5,290
Kerala	95 (1.2)	5 (1.2)	4,149
Madhya Pradesh	7 (1.6)	93 (1.6)	2,680
Maharashtra	74 (2.2)	26 (2.2)	6,610
Meghalaya	65 (2.9)	35 (2.9)	3,725
Mizoram	62 (2.9)	38 (2.9)	2,899
Nagaland	92 (2.0)	8 (2.0)	1,538
Orissa	17 (2.9)	83 (2.9)	2,614
Puducherry	97 (1.2)	3 (1.2)	2,292
Punjab	28 (3.4)	72 (3.4)	3,903
Rajasthan	26 (3.1)	74 (3.1)	3,445
Sikkim	96 (1.2)	4 (1.2)	3,317
Tamil Nadu	55 (3.1)	45 (3.1)	5,730
Tripura	37 (3.3)	63 (3.3)	2,670
Uttar Pradesh	4 (0.9)	96 (0.9)	4,664
Uttarakhand	14 (2.2)	86 (2.2)	4,137
West Bengal	53 (2.9)	47 (2.9)	4,530
Overall Average	**44 (0.5)**	**56 (0.5)**	**1,13,978**

Appendix – VIII

School Related Variables

Table A-8.1: Comparison of school averages on the basis of school management						
School Management	**EVS**		**Reading Comprehension**		**Mathematics**	
	Mean	**SE**	**Mean**	**SE**	**Mean**	**SE**
State Govt./Dept. of Education	256	0.80	254	0.92	257	0.84
Zila Parishad	262	2.27	262	2.32	262	2.50
Local body	263	2.50	262	2.81	259	2.25
Tribal social dept.	230	9.65	240	8.97	238	10.50
Private aided	263	2.44	269	2.42	258	1.97

Table A-8.2: Comparison of school averages by inspection status						
Inspected	**EVS**		**Language**		**Mathematics**	
	Mean	**SE**	**Mean**	**SE**	**Mean**	**SE**
Yes	258	0.80	257	0.87	258	0.73
No	254	1.56	257	1.19	256	1.42

Table A-8.3: Comparison of school averages by parents' participation status							
Parents' participation		**EVS**		**Reading Comprehension**		**Mathematics**	
Attend special events	**Yes**	258	0.69	257	0.77	259	0.69
	No	252	3.05	251	2.95	245	2.23

Table A-8.4: Comparison of school averages by parents' involvement							
Parents' participation		**EVS**		**Reading Comprehension**		**Mathematics**	
		Mean	**SE**	**Mean**	**SE**	**Mean**	**SE**
VEC	**Yes**	258	0.64	257	0.77	259	0.70
	No	252	3.71	247	3.64	252	2.86
PTA	**Yes**	259	0.67	258	0.89	259	0.74
	No	254	1.93	253	1.67	251	1.61

Table A-8.5: Comparison of school averages by ability grouping status					
Students grouped by ability		**Mathematics**		**EVS**	
		Mean	**SE**	**Mean**	**SE**
	Yes	260	0.86	259	0.72
	No	251	1.55	253	1.54

Table A-8.6: Comparison of school averages by programmes offered by schools

		Mathematics		EVS	
		Mean	SE	Mean	SE
Offer enrichment	Yes	258	0.69	257	0.72
	No	255	1.95	254	2.06
Offer remedial	Yes	258	0.75	258	0.71
	No	254	2.06	251	1.79

Table A-8.7: Comparison of school averages by availability of instructional material

Instructional material		EVS		Reading Comprehension		Mathematics	
		Mean	SE	Mean	SE	Mean	SE
Textbooks	Yes	258	0.68	257	0.77	258	0.68
	No	244	5.69	245	9.48	247	9.60
Workbooks	Yes	258	0.93	257	1.11	260	0.97
	No	253	2.18	252	2.11	252	1.86
Teachers' Handbook	Yes	260	1.05	259	1.05	260	0.85
	No	249	2.10	250	2.33	252	2.19
TLM	Yes	258	0.83	257	0.89	260	0.72
	No	255	4.15	251	4.48	247	3.98

Table A-8.8: Comparison of school averages by problem behaviour status

Problem (frequency) Behaviour		EVS		Reading Comprehension		Mathematics	
		Mean	SE	Mean	SE	Mean	SE
Arriving late at School	Never	263	1.55	262	1.71	263	1.55
	Rarely	257	0.89	256	0.91	256	0.95
	Monthly	253	3.81	252	3.31	252	3.95
	Weekly	250	3.38	252	3.62	253	3.72
	Daily	253	6.09	250	5.67	264	5.88
Cheating	Never	260	0.95	259	0.87	260	0.80
	Rarely	254	1.31	253	1.39	254	1.35
	Monthly	251	6.63	252	7.85	250	6.59
	Weekly	244	9.57	249	7.87	253	8.10
	Daily	234	7.64	230	7.69	228	7.40

Appendix - IX

Teacher Related Variables

Table A–9.1: Distribution of teachers on the basis of age			
State or Union Territory	**Below 30 years**	**31–40 years**	**41 to 50 years**	**51 years and above**
	% (SE)	**% (SE)**	**% (SE)**	**% (SE)**
Andhra Pradesh	27.8 (3.6)	38.8 (3.2)	25.8 (3.1)	7.7 (2)
Assam	3.9 (1.2)	26.8 (2.8)	51.3 (2.9)	18 (2)
Bihar	27.7 (3.1)	40.1 (3.4)	18 (2.5)	14.2 (2.2)
Chandigarh	25.2 (4.1)	47.8 (5.2)	11.7 (3)	15.3 (3.9)
Chhattisgarh	47.7 (4.1)	30.1 (3.8)	9.2 (2.4)	13.1 (3.1)
Daman & Diu	28.7 (4.7)	43.6 (5.2)	22.8 (4.5)	5 (1.7)
Delhi	24.7 (4.3)	50.6 (5.6)	20 (4.8)	4.7 (2.4)
Goa	16.9 (4.73)	29.6 (4.65)	29.6 (5.56)	23.9 (4.47)
Gujarat	19.1 (2.6)	48.3 (3.5)	20.9 (2.9)	11.7 (2.1)
Haryana	24.4 (3.5)	48.8 (4.4)	13.1 (2.7)	13.8 (2.7)
Himachal Pradesh	10.4 (2.2)	45.3 (3.2)	35.8 (3.1)	8.6 (2.1)
Jammu & Kashmir	30.1 (2.7)	48.9 (2.3)	16.9 (1.9)	4.1 (1)
Jharkhand	18.7 (2.4)	37.9 (3.2)	26.5 (2.5)	17 (2)
Karnataka	19.7 (2.9)	35.3 (3.2)	28.5 (2.9)	16.5 (2.7)
Kerala	10.3 (1.9)	41.5 (3.1)	39.7 (3.6)	8.5 (2.1)
Madhya Pradesh	14.9 (2.6)	44.1 (3.6)	29.2 (3.3)	11.8 (2.4)
Maharashtra	23.7 (2.7)	48.3 (2.8)	20.7 (2.6)	7.3 (1.5)
Meghalaya	46 (3.2)	33.8 (2.9)	16.7 (2.4)	3.5 (1.1)
Mizoram	11.8 (1.4)	35.3 (2.5)	34.3 (2.5)	18.5 (1.9)
Nagaland	25 (3.1)	48.5 (3.2)	23.5 (3.3)	3.1 (1.2)
Orissa	14.9 (2.2)	36.2 (3.1)	38.1 (3.2)	10.8 (1.8)
Puducherry	48.8 (4.8)	18.2 (2.6)	15.3 (2.6)	17.7 (3.6)
Punjab	30 (3.8)	43.5 (3.8)	12.4 (2.2)	14.1 (2.7)
Rajasthan	18.9 (3.1)	44 (3.6)	28 (3.5)	9.1 (1.8)
Sikkim	18.8 (3)	24.2 (3.9)	44.9 (3.4)	12.1 (2.6)
Tamil Nadu	10.3 (2.2)	35.8 (3.6)	38.2 (3.7)	15.7 (2.7)
Tripura	6.2 (1.7)	36.2 (3.5)	38.9 (3)	18.9 (2.8)
Uttar Pradesh	23.6 (3.2)	37 (3.7)	11.5 (2.1)	27.9 (3)
Uttarakhand	6.4 (1.5)	48.1 (3)	22.3 (2.4)	23.3 (2.6)
West Bengal	27.2 (2.5)	44.3 (2.3)	17.5 (2.1)	11.1 (1.7)
Overall average	**21 (0.5)**	**39.7 (0.6)**	**26.4 (0.5)**	**12.9 (0.4)**

State or Union Territory	Middle	Higher or Senior Secondary	Secondary	Graduation	Post graduation
	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)
Andhra Pradesh	1 (0.7)	8.6 (2.1)	2.9 (1.4)	59.1 (3.6)	28.6 (3.1)
Assam	0.8 (0.5)	33.7 (2.5)	11.8 (1.7)	48.6 (2.7)	5.1 (1.3)
Bihar	2.6 (0.8)	31.9 (3.1)	8.9 (1.6)	46.7 (3.7)	10 (1.9)
Chandigarh	0 (0)	3.6 (2.2)	3.6 (1.3)	25.5 (3.8)	67.3 (4.4)
Chhattisgarh	2.6 (1.3)	38.3 (4.1)	2 (1.1)	37 (4)	20.1 (3.5)
Daman & Diu	6.9 (2.9)	9.9 (3.2)	15.8 (3.6)	25.7 (5.5)	41.6 (6.9)
Delhi	0 (0)	11.6 (3.3)	1.2 (1.2)	31.4 (4.4)	55.8 (5.4)
Goa	4.2 (3.2)	9.9 (4.2)	11.3 (4.3)	35.2 (6.6)	39.4 (6)
Gujarat	15.4 (2.7)	27.3 (3.1)	32.6 (3.6)	15.4 (2.4)	9.3 (2)
Haryana	3.8 (1.3)	19.6 (3.3)	10.1 (2.2)	48.1 (3.9)	18.4 (3.3)
Himachal Pradesh	7.7 (1.9)	35.6 (3.5)	8.6 (2.1)	21.6 (3.1)	26.6 (3.5)
Jammu & Kashmir	0.2 (0.2)	14.3 (1.8)	7.8 (1.4)	44.9 (2.3)	32.8 (2.4)
Jharkhand	0.8 (0.6)	17.7 (2.1)	4.4 (1)	61.7 (2.4)	15.5 (1.9)
Karnataka	4 (1.5)	52 (3.3)	18.8 (2.4)	20.4 (2.7)	4.8 (1.4)
Kerala	1.4 (0.8)	25.6 (3.5)	8.1 (1.9)	52.5 (3.7)	12.6 (2.5)
Madhya Pradesh	1.5 (0.9)	34.5 (3.5)	0.5 (0.5)	39.6 (3.7)	23.9 (3.1)
Maharashtra	2 (1.1)	22.7 (2.5)	11.4 (2)	47.2 (3.3)	16.7 (2.5)
Meghalaya	0.6 (0.5)	38.1 (2.9)	4.2 (1.2)	48.7 (3)	8.3 (1.7)
Mizoram	4.1 (1)	21.9 (2.2)	7.7 (1.4)	61.6 (2.6)	4.7 (1)
Nagaland	2.3 (1.3)	18.3 (2.7)	5.3 (1.9)	65.4 (3.4)	8.8 (2.1)
Orissa	0.7 (0.5)	28.3 (3.1)	22.3 (2.6)	39.4 (3.2)	9.3 (1.9)
Puducherry	0.6 (0.6)	21.1 (3.4)	7 (2.3)	49.1 (3.7)	22.2 (3.3)
Punjab	0.6 (0.6)	13.5 (2.6)	11.8 (2.3)	31.2 (3.7)	42.9 (4.1)
Rajasthan	5.2 (1.7)	20.1 (2.9)	5.2 (1.7)	37.4 (3.8)	32.2 (3.9)
Sikkim	3 (1.6)	44.9 (4.6)	16.2 (2.7)	29.3 (4)	6.6 (2.3)
Tamil Nadu	1 (0.7)	23.3 (3.2)	23.3 (3.5)	25.7 (3.4)	26.7 (3.6)
Tripura	9.3 (2.2)	19.7 (2.4)	34.4 (3.2)	30.5 (3.2)	6.2 (1.8)
Uttar Pradesh	0.5 (0.5)	15.1 (2.7)	6.6 (1.8)	30.7 (3.3)	47.2 (3.7)
Uttarakhand	0 (0)	16.5 (2.5)	6 (1.3)	34 (2.7)	43.5 (3)
West Bengal	0 (0)	0.8 (0.6)	0.6 (0.4)	50.4 (2.8)	48.2 (2.8)
Overall average	**2.6 (0.2)**	**10.3 (0.3)**	**23.2 (0.6)**	**42.7 (0.6)**	**21.3 (0.4)**

Table caption: **Table A-9.2: Teacher's educational qualification**

Table A-9.3: Employment status of teachers					
State or Union Territory	**Regular full time**	**Against leave vacancy**	**Temporary**	**Para teacher**	**Other**
	% (SE)	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**
Andhra Pradesh	81.3 (2.9)	0.5 (0.5)	5.3 (1.9)	10.5 (2.2)	2.4 (1.3)
Assam	97.1 (0.9)	0 (0)	1 (0.5)	0.3 (0.3)	1.6 (0.6)
Bihar	54.9 (3.5)	1.6 (0.8)	4.9 (1.7)	29.7 (3.3)	8.9 (2.3)
Chandigarh	66.7 (3.9)	0 (0)	3.9 (2)	4.9 (4.9)	24.5 (4.2)
Chhattisgarh	30.4 (3.4)	0.7 (0.7)	4.7 (1.8)	63.5 (3.5)	0.7 (0.7)
Daman & Diu	76.6 (5.8)	2.1 (1.5)	3.2 (1.8)	18.1 (0)	0 (0)
Delhi	95.3 (2.3)	0 (0)	3.5 (2)	0 (0)	1.2 (1.2)
Goa	87.3 (4.3)	7 (3)	4.2 (2.4)	0 (0)	1.4 (1.3)
Gujarat	85.2 (2.7)	0 (0)	8.7 (2.3)	0.4 (0.4)	5.7 (1.8)
Haryana	81.9 (3.1)	0 (0)	2.5 (1.2)	13.8 (2.6)	1.9 (1.1)
Himachal Pradesh	85.1 (2.4)	0.5 (0.5)	1.9 (0.9)	6.5 (1.6)	6 (2)
Jammu & Kashmir	76.6 (2.3)	0 (0)	1.7 (0.8)	17.5 (1.9)	4.2 (1.2)
Jharkhand	48.2 (3.4)	0 (0)	2.5 (0.8)	49 (3.4)	0.3 (0.3)
Karnataka	99.2 (0.6)	0.4 (0.4)	0.4 (0.4)	0 (0)	0 (0)
Kerala	97.7 (1.4)	0.9 (0.9)	0.9 (0.9)	0 (0)	0.5 (0.5)
Madhya Pradesh	53.4 (4)	1.9 (0.8)	5.8 (1.9)	35.4 (4.1)	5.3 (1.7)
Maharashtra	95 (1.5)	0 (0)	2.3 (1)	1.7 (0.9)	1 (0.6)
Meghalaya	81.3 (2.7)	0 (0)	14.2 (2.4)	0.3 (0.3)	2.3 (1.1)
Mizoram	82.5 (2)	1.2 (0.5)	8.2 (1.6)	5.2 (1.2)	3 (0.8)
Nagaland	52.6 (3.5)	4.1 (1.4)	39.8 (3.4)	0 (0)	3.4 (1.2)
Orissa	63.9 (2.9)	0 (0)	1.5 (0.8)	25.6 (2.8)	9 (2)
Puducherry	86.4 (2.4)	0.6 (0.6)	12.4 (2.4)	0 (0)	0.6 (0.6)
Punjab	76.3 (3.6)	0.6 (0.6)	4.1 (1.8)	8.9 (2.4)	10.1 (2.5)
Rajasthan	81.3 (3.1)	1.2 (0.8)	4.7 (1.6)	7.6 (2.1)	5.3 (1.7)
Sikkim	95.1 (1.9)	0.6 (0.6)	3 (1.6)	0.6 (0.6)	0.6 (0.6)
Tamil Nadu	99.5 (0.5)	0 (0)	0 (0)	0.5 (0.5)	0 (0)
Tripura	83.5 (2.4)	0.8 (0.6)	6.7 (1.9)	6.3 (1.9)	2.7 (1.3)
Uttar Pradesh	82.8 (2.5)	0 (0)	7.4 (1.5)	9.3 (2)	0.5 (0.5)
Uttarakhand	84 (2.3)	0.7 (0.7)	4.3 (1.5)	9.9 (1.7)	1.1 (0.6)
West Bengal	79.7 (2.3)	0.6 (0.4)	0.8 (0.6)	18.6 (2.2)	0.3 (0.3)
Overall average	**78.7 (0.5)**	**0.7 (0.1)**	**5.7 (0.3)**	**11.8 (0.4)**	**3.1 (0.2)**

Table A-9.4: Professional qualifications of teachers			
State or Union Territory	**Primary or elementary teaching certificate or diploma**	**Graduate Training B.Ed.**	**M.Ed. and others**
	% (SE)	**% (SE)**	**% (SE)**
Andhra Pradesh	28.9 (2.9)	69.2 (3)	2 (1)
Assam	89.4 (2)	9.9 (1.9)	0.7 (0.5)
Bihar	86.4 (2.7)	12.1 (2.7)	1.5 (0.8)
Chandigarh	34.2 (5.4)	56.8 (5.5)	9 (3.2)
Chhattisgarh	81.5 (3)	17.6 (2.9)	0.8 (0.8)
Daman & Diu	42.6 (4.6)	56.4 (4.9)	1 (1)
Delhi	42.5 (5)	56.3 (4.9)	1.1 (1.1)
Goa	38.2 (7.5)	61.8 (7.5)	0 (0)
Gujarat	84.3 (2.5)	13.5 (2.2)	2.2 (1)
Haryana	66.2 (3.4)	32.5 (3.3)	1.3 (0.9)
Himachal Pradesh	74.2 (3.6)	24.4 (3.4)	1.4 (0.8)
Jammu & Kashmir	28.6 (3)	60 (3.4)	11.4 (2.1)
Jharkhand	74.2 (3)	25.2 (2.9)	0.6 (0.4)
Karnataka	96 (1.1)	3.6 (1.1)	0.4 (0.4)
Kerala	52.5 (3.6)	46.6 (3.6)	0.9 (0.6)
Madhya Pradesh	83.8 (2.9)	14.5 (2.9)	1.7 (1)
Maharashtra	82.1 (2.4)	17.2 (2.3)	0.7 (0.5)
Meghalaya	68.5 (3.7)	29.5 (3.7)	2 (1.2)
Mizoram	73.7 (2.2)	25.9 (2.2)	0.4 (0.3)
Nagaland	49 (5.2)	50.3 (5.3)	0.7 (0.7)
Orissa	77.5 (2.6)	20.6 (2.5)	2 (0.9)
Puducherry	74.9 (3.4)	24 (3.5)	1.2 (0.8)
Punjab	44.4 (3.9)	51.5 (3.8)	4.1 (1.6)
Rajasthan	34.5 (3.6)	63.6 (3.6)	1.8 (1.1)
Sikkim	87.9 (3.5)	11.4 (3.4)	0.7 (0.7)
Tamil Nadu	81.3 (2.7)	15.3 (2.6)	3.4 (1.3)
Tripura	78.4 (3.4)	20.3 (3.5)	1.3 (0.8)
Uttar Pradesh	48.7 (4)	45.7 (4.1)	5.6 (1.9)
Uttarakhand	66.2 (2.9)	32.7 (2.9)	1.1 (0.4)
West Bengal	10.9 (2.2)	86.5 (2.3)	2.6 (1)
Overall average	**65.2 (0.5)**	**32.8 (0.6)**	**2.1 (0.2)**

Table A-9.5: Agencies who provide in-service training						
State or Union Territory	**BRC**	**CRC**	**DIET or DRC**	**Other**	**SCERT or SIE**	**School complex**	**TRC**
	% (SE)	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**	**% (SE)**
Andhra Pradesh	2.8 (1.5)	5.7 (2)	5.7 (2.1)	0 (0)	0 (0)	72.2 (3.6)	13.6 (2.8)
Assam	19.6 (2.4)	56 (2.6)	12.3 (2)	0 (0)	0.6 (0.6)	6.3 (1.7)	5.1 (1.5)
Bihar	24.9 (3.5)	24.5 (3.2)	7 (2.1)	0.8 (0.8)	4.7 (1.4)	35 (3.7)	3.1 (1.4)
Chandigarh	0 (0)	67.5 (5.5)	7.8 (3.2)	0 (0)	15.6 (3.9)	7.8 (3.2)	1.3 (1.3)
Chhattisgarh	36.4 (4.2)	12.9 (3.2)	10 (2.2)	0 (0)	7.9 (2.1)	30 (3.8)	2.9 (1.4)
Daman & Diu	46.5 (6.3)	47.5 (4.8)	3 (3)	0 (0)	2 (2)	0 (0)	1 (1)
Delhi	0 (0)	1.5 (1.5)	35.8 (5.9)	0 (0)	53.7 (6.3)	4.5 (2.6)	4.5 (2.5)
Goa	19.6 (5.6)	13.7 (6.7)	9.8 (4.6)	2 (2)	5.9 (3.1)	37.3 (6.5)	11.8 (4.4)
Gujarat	5.7 (1.8)	76.1 (3.5)	13 (2.5)	0 (0)	2.2 (1.3)	3 (1.4)	0 (0)
Haryana	26.7 (6.1)	11.7 (4.3)	6.7 (3.2)	0 (0)	31.7 (6.1)	16.7 (5)	6.7 (3.2)
Himachal Pradesh	40.8 (3.9)	14.6 (2.6)	29.1 (3.8)	0 (0)	0 (0)	10.2 (2.4)	5.3 (1.9)
Jammu & Kashmir	43.2 (3.1)	31.4 (2.8)	23.9 (3)	0 (0)	0 (0)	1.3 (0.6)	0.3 (0.3)
Jharkhand	24.4 (3.4)	32.2 (3.7)	4.7 (1.9)	0 (0)	1.3 (0.8)	31.9 (3.7)	5.6 (2.1)
Karnataka	43.8 (3.7)	45 (3.7)	2.1 (1.1)	0.4 (0.4)	0 (0)	7 (1.7)	1.7 (1)
Kerala	77.9 (3.3)	16.2 (2.4)	1.4 (1)	0 (0)	0 (0)	3.6 (1.7)	0.9 (0.6)
Madhya Pradesh	7.3 (1.8)	53.6 (2.8)	23.4 (2.2)	0 (0)	0 (0)	14.1 (2.3)	1.6 (0.9)
Maharashtra	57.2 (3.8)	10.7 (2.7)	8.5 (2)	0 (0)	12.5 (2.2)	2.6 (1)	8.5 (1.8)
Meghalaya	17.8 (3.1)	6.7 (1.8)	62 (4.5)	0 (0)	1.8 (1)	6.7 (2.2)	4.9 (1.9)
Mizoram	39.8 (2.9)	23 (2.5)	28.5 (2.3)	0 (0)	3.2 (0.9)	4.8 (1.5)	0.7 (0.4)
Nagaland	46.8 (4.5)	7.7 (2.9)	16 (3)	1.9 (1.1)	19.9 (3.9)	3.2 (1.4)	4.5 (1.7)
Orissa	61.1 (4)	32 (3.6)	1.6 (1)	0 (0)	1.6 (1)	2.4 (1.1)	1.2 (0.7)
Puducherry	52.3 (6.4)	7.5 (3.2)	13.1 (4.2)	4.7 (1.6)	12.1 (4.8)	0 (0)	10.3 (3.8)
Punjab	24.8 (3.4)	39 (3.8)	8.5 (2.2)	0 (0)	5.7 (1.7)	20.6 (2.6)	1.4 (1)
Rajasthan	33.6 (4.1)	18.5 (3.4)	11.6 (2.1)	0.7 (0.7)	4.8 (1.8)	25.3 (3.8)	5.5 (1.9)
Sikkim	21.5 (4.1)	5.4 (2.8)	51.6 (5.5)	3.2 (1.9)	14 (3.5)	1.1 (1.1)	3.2 (1.9)
Tamil Nadu	24 (3.4)	74.3 (3.6)	0 (0)	0 (0)	0 (0)	1.8 (1)	0 (0)
Tripura	78.3 (3.3)	6.4 (1.8)	7.7 (1.9)	0.9 (0.9)	1.7 (1)	2.6 (1.2)	2.6 (1.2)
Uttar Pradesh	50 (3.8)	8.5 (2)	29.8 (3.8)	0.5 (0.5)	1.6 (0.9)	5.3 (1.9)	4.3 (1.7)
Uttarakhand	20.6 (2.5)	36.5 (3.5)	17.7 (2.8)	0 (0)	2.2 (1)	21.7 (2.7)	1.4 (0.7)
West Bengal	17.3 (2.8)	19.1 (3.7)	45.8 (4.2)	0 (0)	0.9 (0.6)	7.6 (2.2)	9.3 (1.7)
Overall average	**33.6 (0.7)**	**29.3 (0.6)**	**16.4 (0.5)**	**0.3 (0.1)**	**4.7 (0.3)**	**11.7 (0.5)**	**3.8 (0.3)**

Table A–9.6: Teachers giving homework			
State or Union Territory	**Regularly**	**Sometimes**	**Not at all**
	% (SE)	**% (SE)**	**% (SE)**
Andhra Pradesh	91.9 (1.9)	7.6 (1.9)	0.5 (0.5)
Assam	83.2 (2.5)	16.5 (2.5)	0.3 (0.3)
Bihar	91.8 (2.0)	8.2 (2.0)	0 (0)
Chandigarh	91.1 (2.8)	8.9 (2.8)	0 (0)
Chhattisgarh	92.9 (2.2)	6.5 (2.1)	0.6 (0.7)
Daman & Diu	78.2 (6.2)	21.8 (6.2)	0 (0)
Delhi	87.4 (3.5)	12.6 (3.5)	0 (0)
Goa	81.7 (5.5)	16.9 (5.3)	1.4 (1.4)
Gujarat	89.1 (2.2)	10.9 (2.2)	0 (0)
Haryana	100.0 (0.0)	0 (0)	0 (0)
Himachal Pradesh	98.6 (0.8)	1.4 (0.8)	0 (0)
Jammu & Kashmir	93.2 (1.4)	6.6 (1.4)	0.2 (0.2)
Jharkhand	83.8 (2.6)	15.9 (2.5)	0.3 (0.3)
Karnataka	92.4 (1.7)	7.6 (1.7)	0 (0)
Kerala	69.7 (3.5)	29 (3.4)	1.4 (1.0)
Madhya Pradesh	93.9 (1.8)	6.1 (1.8)	0 (0)
Maharashtra	96.7 (1.1)	3.3 (1.1)	0 (0)
Meghalaya	76.5 (2.8)	23.5 (2.8)	0 (0)
Mizoram	62.9 (2.9)	36.9 (2.9)	0.2 (0.2)
Nagaland	62.5 (3.5)	36.7 (3.5)	0.8 (0.8)
Orissa	80.7 (3.2)	19.0 (3.2)	0.4 (0.4)
Puducherry	94.7 (1.7)	5.3 (1.7)	0 (0)
Punjab	98.8 (0.8)	0.6 (0.6)	0.6 (0.6)
Rajasthan	94.8 (1.7)	5.2 (1.7)	0 (0)
Sikkim	77.7 (3.3)	22.3 (3.3)	0 (0)
Tamil Nadu	98.2 (1.3)	0.6 (0.6)	1.2 (1.2)
Tripura	76 (3.2)	19.7 (2.9)	4.3 (1.5)
Uttar Pradesh	94.8 (1.7)	5.2 (1.7)	0 (0)
Uttarakhand	91.4 (1.8)	8.6 (1.8)	0 (0)
West Bengal	74.9 (2.7)	23.5 (2.7)	1.7 (0.8)
Overall average	**85.1 (0.5)**	**14.4 (0.5)**	**0.5 (0.1)**

Table A-9.7: Maintain teacher's diary		
State or Union Territory	**Yes**	**No**
	% (SE)	**% (SE)**
Andhra Pradesh	95.7 (1.7)	4.3 (1.7)
Assam	71.8 (3.1)	28.2 (3.1)
Bihar	82.6 (2.9)	17.4 (2.9)
Chandigarh	99.1 (0.9)	0.9 (0.9)
Chhattisgarh	90.2 (2.3)	9.8 (2.3)
Daman & Diu	95.0 (1.7)	5.0 (1.7)
Delhi	100.0 (0.0)	0 (0)
Goa	91.5 (2.8)	8.5 (2.8)
Gujarat	98.7 (0.8)	1.3 (0.8)
Haryana	93.1 (2.1)	6.9 (2.1)
Himachal Pradesh	86.7 (2.9)	13.3 (2.9)
Jammu & Kashmir	97.8 (0.9)	2.2 (0.9)
Jharkhand	77.0 (3.0)	23.0 (3.0)
Karnataka	93.6 (1.8)	6.4 (1.8)
Kerala	90.0 (2.3)	10.0 (2.3)
Madhya Pradesh	88.7 (2.3)	11.3 (2.3)
Maharashtra	91.9 (2.0)	8.1 (2.0)
Meghalaya	81.9 (2.7)	18.1 (2.7)
Mizoram	41.1 (3.1)	58.9 (3.1)
Nagaland	88.0 (2.5)	12.0 (2.5)
Orissa	96.2 (1.3)	3.8 (1.3)
Puducherry	71.7 (4.2)	28.3 (4.2)
Punjab	98.8 (0.8)	1.2 (0.8)
Rajasthan	92.4 (1.8)	7.6 (1.8)
Sikkim	91.0 (2.8)	9.0 (2.8)
Tamil Nadu	82.2 (3.9)	17.8 (3.9)
Tripura	70.0 (3.8)	30.0 (3.8)
Uttar Pradesh	98.5 (1.1)	1.5 (1.1)
Uttarakhand	77.0 (3.1)	23.0 (3.1)
West Bengal	69.8 (3.2)	30.2 (3.2)
Overall average	**83.5 (0.5)**	**16.5 (0.5)**

Table A-9.8: Status of Teacher's Handbook, TLM grant, TLM and audio-visual facilities				
State or Union Territory	**Teacher's Handbook**	**TLM grant**	**TLM**	**Audio-visual facilities**
	% (SE)	**% (SE)**	**% (SE)**	**% (SE)**
Andhra Pradesh	94.6 (1.8)	64 (3.2)	97.1 (2.9)	49.7 (4)
Assam	77.7 (2.8)	81 (2.7)	98.5 (1.5)	22.5 (2.9)
Bihar	68 (3.5)	74.5 (3.4)	94.4 (5.6)	37.2 (3.9)
Chandigarh	87.9 (3.6)	84.9 (3.8)	97.2 (2.8)	63.3 (6.1)
Chhattisgarh	93.4 (2.1)	82.9 (3.2)	92.6 (7.4)	55.2 (4.5)
Daman & Diu	72.3 (7.9)	93.9 (2.5)	100 (0)	72.5 (5.9)
Delhi	69.3 (5.1)	88 (3.8)	98.8 (1.2)	75.3 (4.7)
Goa	80 (6.7)	83.3 (5.1)	97.1 (2.9)	47.5 (7.9)
Gujarat	72.2 (3.9)	96.4 (1.7)	98.3 (1.7)	81.7 (3.5)
Haryana	78.6 (3.2)	81.8 (3.1)	96.1 (3.9)	84.9 (3.1)
Himachal Pradesh	93.6 (2.1)	92.8 (1.8)	99.5 (0.5)	46.8 (4.8)
Jammu & Kashmir	79 (2.7)	68.7 (2.9)	97.8 (2.2)	11.4 (2.1)
Jharkhand	79 (2.7)	63.7 (3.9)	96.4 (3.6)	45.9 (3.9)
Karnataka	94.8 (1.4)	90.8 (2.2)	98 (2)	60.2 (3.8)
Kerala	100 (0)	96.8 (1)	100 (0)	82 (3.4)
Madhya Pradesh	94.2 (1.6)	81.9 (2.9)	100 (0)	64.2 (3.4)
Maharashtra	93.2 (1.6)	84.1 (2.4)	98.3 (1.7)	70.2 (3.1)
Meghalaya	84.3 (2.8)	36.2 (3.5)	71.4 (28.6)	6.8 (1.9)
Mizoram	83 (2.1)	56.3 (2.8)	71.4 (28.6)	12.3 (2.2)
Nagaland	83.9 (3.3)	75.7 (4.2)	84.6 (15.4)	10.8 (2.8)
Orissa	90 (2.1)	86.5 (2.5)	98.5 (1.5)	8.9 (2.1)
Puducherry	76.9 (4.2)	91.2 (3.2)	98.2 (1.8)	55.3 (6.7)
Punjab	81.1 (3.1)	89.3 (2.9)	94.7 (5.3)	38.2 (3.9)
Rajasthan	83.7 (3)	77.4 (2.8)	92.4 (7.6)	45.5 (3.7)
Sikkim	87.8 (2.8)	36.9 (4.7)	64.4 (35.6)	11.6 (3.3)
Tamil Nadu	92.1 (2.4)	16.5 (3.3)	98.8 (1.2)	87 (3.4)
Tripura	66.2 (4.1)	82.4 (2.8)	98 (2)	5 (2)
Uttar Pradesh	95.1 (1.8)	71.2 (4.3)	95.7 (4.3)	32.1 (4.6)
Uttarakhand	87.7 (2)	86.2 (2.6)	98.2 (1.8)	28.6 (3.1)
West Bengal	75.1 (2.9)	72 (3.4)	92.2 (7.8)	9.6 (2.4)
Overall average	**83.9 (0.5)**	**75.2 (0.6)**	**93.1 (6.9)**	**38.8 (0.6)**

State or Union Territory	Discussion about how to teach a particular concept			Preparing instructional material			Visit to another teacher's classroom to observe his/ her teaching			Informal observation of classroom observation by other teachers		
	1 to 3 times per week	2 to 3 times per month	Almost never	1 to 3 times per week	2 to 3 times per month	Almost never	1 to 3 times per week	2 to 3 times per month	Almost never	1 to 3 times per week	2 to 3 times per month	Almost never
	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	%(SE)
Andhra Pradesh	49.3 (4.2)	44.4 (4.0)	6.3 (2.2)	38.0 (3.6)	57.5 (3.7)	4.5 (1.9)	30.5 (3.5)	48.0 (3.9)	21.5 (2.9)	28.1 (3.6)	50.8 (4.2)	21.1 (3.2)
Assam	58.3 (3.2)	38.5 (3.1)	3.1 (1.2)	38.7 (3.0)	55.2 (3.1)	6.1 (1.6)	25.3 (2.7)	52.2 (3.2)	22.4 (2.7)	25.9 (2.9)	45.8 (3.5)	28.3 (2.8)
Bihar	54.8 (3.6)	40.7 (3.5)	4.6 (1.6)	37.8 (3.9)	47.7 (3.6)	14.5 (2.4)	34.4 (3.4)	39.5 (3.1)	26.1 (3.4)	34.0 (3.7)	43.1 (3.6)	22.9 (3.4)
Chandigarh	60.4 (3.9)	36.9 (3.7)	2.7 (1.5)	35.5 (5.5)	60.0(4.9)	4.5 (2.4)	20.8 (4.5)	41.5 (4.7)	37.7 (5.1)	21.7 (4.3)	46.2 (4.4)	32.1 (5.2)
Chhattisgarh	67.3 (4.1)	31.3 (4.1)	1.3 (0.9)	39.3 (4.9)	55.7 (4.6)	5.0 (1.9)	40.9 (4.4)	51 (4.3)	8.1 (2.6)	26.5 (3.9)	52.4 (4.5)	21.1 (3.8)
Daman & Diu	57.1 (6.9)	38.8 (7.3)	4.1 (3.2)	29.5 (5.1)	49.5 (6.2)	21.1 (4.4)	29.3 (6.9)	47.5 (7.2)	23.2 (7.0)	26.5 (8.0)	57.1 (6.4)	16.3 (5.4)
Delhi	70.1 (5.2)	29.9 (5.2)	0 (0)	51.9 (6.3)	44.4 (6.1)	3.7 (2.1)	24.7 (4.8)	50.6 (5.9)	24.7 (3.8)	21.2 (4.9)	58.8 (6.1)	20.0 (3.6)
Goa	43.5 (7.1)	49.3 (7.3)	7.2 (3.1)	33.8 (6.8)	57.4 (7.1)	8.8 (2.9)	13.4 (4.9)	25.4 (6.6)	61.2 (8.2)	24.2 (5.1)	36.4 (7.1)	39.4 (6.8)
Gujarat	59.1 (4.5)	37.3 (4.1)	3.6 (1.7)	35.7 (4.1)	57.3 (4.4)	7.0 (1.8)	36.9 (3.9)	50.9 (4.1)	12.1 (3.0)	27.0 (3.6)	62.3 (3.9)	10.7 (2.5)
Haryana	61.2 (3.7)	32.9 (3.5)	5.9 (2.0)	53.0 (4.2)	39.6 (4.3)	7.4 (2.0)	45.7 (4.0)	38.4 (3.6)	15.9 (2.9)	35.1 (4.2)	51.0 (4.3)	13.9 (2.7)
Himachal Pradesh	53.9 (3.8)	45.7 (3.8)	0.5 (0.5)	37.1 (3.6)	60 (3.7)	2.9 (1.2)	31.8 (3.7)	53.9 (4.0)	14.3 (2.9)	26.5 (3.6)	61.4 (4.1)	12.1 (2.6)
Jammu & Kashmir	55.4 (2.9)	41.5 (2.8)	3.2 (0.9)	50.1 (2.7)	46.2 (2.8)	3.7 (1.0)	33 (2.7)	45.8 (2.9)	21.2 (2.4)	30.9 (2.6)	50.5 (2.8)	18.6 (2.3)
Jharkhand	59.2 (3.4)	37.7 (3.2)	3.0 (1.2)	35.8 (3.5)	55.1 (3.7)	9.1 (2.2)	31.3 (3.1)	49.7 (3.4)	19 (3.2)	24.1 (3.0)	53.8 (3.5)	22.1 (3.0)
Karnataka	60.1 (3.4)	37.5 (3.4)	2.4 (1.3)	55.6 (3.4)	42.0 (3.4)	2.4 (1.1)	30.9 (3.3)	50.8 (3.7)	18.3 (2.7)	26.7 (3.0)	56.0 (3.7)	17.3 (2.8)
Kerala	52.3 (4.1)	46.8 (4.0)	0.9 (0.6)	51.6 (4.6)	46.6 (4.6)	1.8 (0.9)	13 (2.4)	48.6 (4.0)	38.4 (3.7)	15.6 (3.2)	55.0 (4.3)	29.4 (3.5)
Madhya Pradesh	52.0 (3.8)	45.4 (3.8)	2.6 (1.1)	40.4 (3.1)	46.8 (3.4)	12.8 (2.4)	55.3 (3.5)	33.7 (3.2)	11.1 (2.3)	33.2 (3.6)	51.3 (3.8)	15.5 (2.7)
Maharashtra	59.7 (2.8)	38.9 (2.8)	1.3 (0.7)	48.6 (3.3)	50.3 (3.3)	1.0 (0.6)	29.3 (2.9)	55.2 (3.3)	15.5 (2.3)	26.6 (2.9)	60.6 (3.5)	12.8 (2.3)
Meghalaya	53.3 (3.5)	40.5 (3.3)	6.2 (1.6)	33.9 (3.8)	45.0 (3.8)	21.1 (3.0)	12.7 (2.1)	28.8 (3.4)	58.5 (3.4)	12.3 (2.5)	31.4 (3.6)	56.3 (4.0)
Mizoram	38.2 (2.4)	45.0 (2.9)	16.9 (2.1)	27.3 (2.7)	42.4 (3.1)	30.3 (2.8)	9.1 (1.6)	14.7 (2.0)	76.3 (2.2)	8.7 (1.5)	15.2 (2.0)	76.1 (2.4)
Nagaland	53.2 (3.3)	42.2 (3.3)	4.6 (1.1)	36.1 (3.5)	53.6 (3.9)	10.3 (2.6)	14.1 (3.3)	31.7 (3.5)	54.2 (3.5)	13.1 (2.8)	38.2 (3.6)	48.6 (4.0)

Orissa	54.5 (3.5)	42.2 (3.4)	3.4 (1.2)	51.9 (3.5)	44.8 (3.4)	3.4 (1.2)	33.5 (3.2)	42.5 (3.7)	24.1 (2.8)	32.6 (3.4)	46.2 (3.9)	21.2 (3.3)
Puducherry	50.3 (4.4)	43.9 (4.3)	5.8 (1.7)	45.0 (4.2)	44.4 (3.9)	10.5 (2.6)	17.1 (3.6)	37.1 (4.4)	45.9 (5.2)	14.8 (3.4)	41.4 (3.8)	43.8 (5.0)
Punjab	60.0 (3.8)	34.7 (3.5)	5.3 (2.3)	40.6 (3.9)	50.6 (3.9)	8.8 (2.5)	46.2 (3.9)	40.2 (3.7)	13.6 (2.5)	35.9 (3.7)	50.9 (3.9)	13.2 (3.0)
Rajasthan	57.6 (3.7)	37.1 (3.6)	5.3 (1.7)	41.9 (4.0)	46.3 (3.8)	11.9 (2.6)	38.9 (3.6)	43.7 (3.6)	17.4 (3.0)	29.8 (3.6)	47.6 (3.8)	22.6 (3.1)
Sikkim	47.3 (4.7)	46.1 (5.0)	6.6 (2.5)	34.1 (3.8)	48.8 (4.8)	17.1 (3.6)	11.7 (2.9)	23.9 (4.2)	64.4 (4.7)	13.6 (2.9)	29.0 (3.0)	57.4 (4.6)
Tamil Nadu	62.4 (4.5)	35.2 (4.5)	2.4 (1.2)	62.3 (4.4)	34.0 (4.3)	3.7 (1.5)	32.5 (3.7)	41.7 (4.5)	25.8 (4.1)	26.3 (4.1)	45.0 (4.7)	28.8 (4.2)
Tripura	55.7 (3.9)	40.3 (3.8)	4.0 (1.5)	57.8 (3.6)	37.5 (3.5)	4.8 (1.6)	36.4 (4.3)	37.6 (3.4)	26 (4.0)	37.1 (4.0)	32.7 (3.4)	30.2 (3.9)
Uttar Pradesh	63.2 (4.0)	35.4 (3.9)	1.4 (0.8)	35.8 (4.1)	56.0 (4.4)	8.3 (2.5)	55.6 (4.3)	37.4 (4.0)	7.1 (2.2)	32.1 (3.8)	51.5 (4.3)	16.3 (2.7)
Uttarakhand	55.3 (3.7)	38.7 (3.7)	6.0 (1.6)	39.6 (3.7)	51.5 (3.7)	9.0 (2.1)	40.4 (3.4)	37.2 (3.5)	22.4 (3.1)	27.5 (3.2)	45.8 (3.2)	26.7 (3.3)
West Bengal	63.1 (3.0)	33.0 (3.0)	3.9 (1.0)	40.2 (3.5)	46.8 (3.4)	12.9 (2.3)	16.1 (2.5)	22.7 (2.7)	61.2 (3.7)	19.9 (2.9)	30.5 (3.4)	49.6 (3.8)
Overall average	**55.5 (0.6)**	**39.9 (0.6)**	**4.6 (0.3)**	**41.7 (0.7)**	**48.7 (0.8)**	**9.7 (0.4)**	**28.7 (0.7)**	**40 (0.7)**	**31.3 (0.6)**	**24.6 (0.7)**	**45.0 (0.7)**	**30.4 (0.6)**

Table A–9.10: School related problems

State or Union Territory	School building needs repair			Classroom overcrowded			No workspace outside classroom			Material not available for experiments		
	Not a problem	Serious problem	Minor problem	Minor problem	Not a problem	Serious problem	Minor problem	Not a problem	Serious problem	Minor problem	Not a problem	Serious problem
	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)
Andhra Pradesh	43.1 (4)	9.1 (2.3)	47.8 (4.1)	21.8 (3.3)	68.4 (3.9)	9.7 (2.4)	25.4 (3.7)	65.7 (4.1)	9 (1.9)	38.3 (3.7)	42.2 (3.9)	19.4 (2.9)
Assam	13.1 (2.1)	24 (2.7)	62.9 (3.2)	45.3 (3.4)	31.1 (3.2)	23.6 (2.8)	44.5 (3.4)	40.9 (3.5)	14.6 (2.4)	59.8 (3.1)	18.8 (2.6)	21.4 (2.7)
Bihar	25.7 (3.5)	24.2 (3.2)	50.2 (3.6)	32.7 (3.5)	32 (3.8)	35.3 (3.6)	44.4 (3.3)	31.6 (3.2)	24 (3.3)	37.4 (3.8)	13.4 (2.6)	49.2 (3.9)
Chhattisgarh	34.8 (4.3)	15.5 (3.2)	49.7 (4.4)	33.1 (4)	61 (4.2)	5.8 (2)	39.9 (4.7)	54.7 (4.7)	5.4 (1.9)	45.4 (4.4)	29.6 (4.2)	25 (3.9)
Delhi	52.4 (5.7)	6 (2.7)	41.7 (5.3)	19.8 (4.8)	66.3 (5.3)	14 (2.9)	42.7 (5.4)	53.7 (5.5)	3.7 (2.1)	19.8 (3.9)	75.6 (4.2)	4.7 (2.3)
Goa	31 (6.7)	7 (3.8)	62 (6.4)	22.5 (6.1)	70.4 (6.1)	7 (3.8)	32.9 (5.5)	57.1 (6)	10 (3.9)	30 (6)	65.7 (5.2)	4.3 (3.2)
Gujarat	48.5 (4)	14 (3.1)	37.6 (4)	30.5 (3.4)	57.4 (3.9)	12.1 (3)	20.4 (3.2)	66.8 (3.6)	12.8 (2.3)	53.5 (4.5)	38.2 (4.4)	8.3 (2.1)
Haryana	53.2 (3.8)	10.1 (2.5)	36.7 (3.7)	20.8 (2.9)	70.4 (3.4)	8.8 (2.4)	26 (3.5)	70.7 (3.4)	3.3 (1.5)	27.7 (3.3)	63.5 (3.4)	8.8 (2.2)
Himachal Pradesh	23.9 (3.2)	18.5 (3.2)	57.7 (3.9)	16.5 (2.9)	79.4 (3.1)	4.1 (1.4)	41.5 (4.1)	47.3 (4)	11.1 (2.9)	45.3 (3.7)	32.2 (3.3)	22.4 (3.2)
Jammu & Kashmir	10.1 (1.9)	34 (2.7)	55.9 (2.9)	26.8 (2.5)	31.5 (2.8)	41.6 (2.8)	28.1 (2.8)	32.2 (2.9)	39.7 (3.1)	23.3 (2.2)	16.3 (2.1)	60.4 (2.7)

Jharkhand	26.8 (3.2)	16.7 (2.9)	56.6 (3.9)	39.2 (3.8)	35.9 (3.8)	24.9 (3.6)	39.8 (3.4)	36.4 (3.4)	23.8 (3.5)	46.7 (3.9)	27.2 (3)	26.1 (3.1)
Karnataka	38.4 (3.7)	10 (2.4)	51.6 (3.9)	25 (3.2)	69.8 (3.2)	5.2 (1.6)	23.5 (3)	70.4 (3.6)	6.1 (2)	42.7 (3.7)	42.3 (3.7)	14.9 (2.6)
Kerala	48.2 (4.2)	7.6 (1.8)	44.2 (3.9)	25.9 (4.1)	59.4 (4.3)	14.7 (3.3)	32.9 (4.1)	54.1 (4.5)	13.1 (2.8)	37.6 (4.1)	57.5 (4)	5 (1.9)
Madhya Pradesh	35.9 (3.8)	10.3 (2.4)	53.8 (3.6)	28.4 (3.1)	58.2 (3.4)	13.4 (2.4)	30.7 (3.4)	56.8 (3.5)	12.5 (2.5)	35.3 (3.8)	35.3 (3.2)	29.5 (3.6)
Maharashtra	40.8 (3.5)	12 (2.3)	47.2 (3.4)	30.9 (3.1)	60.4 (3.3)	8.7 (2.1)	35.3 (3.1)	59.7 (3.4)	5.1 (1.6)	43.6 (3.6)	47 (3.5)	9.5 (2.1)
Meghalaya	8.4 (1.9)	24.4 (3.2)	67.2 (3.3)	41.2 (3.6)	28.1 (3.4)	30.7 (3.5)	48.7 (3.4)	33.9 (3.3)	17.4 (2.6)	40.8 (3.2)	9.5 (2)	49.7 (3.5)
Mizoram	17.6 (2.2)	21.7 (2.6)	60.7 (2.8)	25.9 (2.8)	62.9 (3.3)	11.2 (2)	29.5 (2.5)	63.1 (3)	7.4 (1.6)	41.1 (2.7)	16.4 (2.2)	42.5 (2.8)
Nagaland	6.2 (1.8)	38.1 (3.9)	55.8 (3.8)	36.9 (3.7)	32.7 (3.8)	30.4 (3.5)	50.6 (4.2)	31 (3.4)	18.4 (2.9)	39.2 (4)	8.4 (2.1)	52.5 (4)
Orissa	11.5 (2.6)	33.5 (4)	55 (4.2)	37 (4.1)	32.8 (4)	30.2 (3.9)	46.9 (3.6)	34.7 (3.4)	18.3 (2.7)	49.2 (4.1)	21 (3.1)	29.8 (3.5)
Punjab	34.7 (4.2)	10 (2.3)	55.3 (4.3)	18.8 (3.3)	75.9 (3.7)	5.3 (1.8)	20.1 (3.5)	75.7 (3.8)	4.1 (1.6)	31 (3.6)	46.4 (4)	22.6 (3.7)
Rajasthan	37.7 (3.5)	14.3 (2.6)	48 (3.6)	25.7 (3.1)	66.9 (3.5)	7.4 (1.7)	33.1 (3.4)	60.5 (3.6)	6.4 (1.9)	30.4 (3.4)	44 (3.5)	25.6 (3.2)
Sikkim	13.7 (3.4)	36.3 (5.2)	50 (4.9)	29.8 (3.7)	36.9 (4.2)	33.3 (4)	30.5 (4.2)	43.1 (4.5)	26.3 (3.7)	46.7 (4.7)	13.8 (2.9)	39.5 (4.8)
Tamil Nadu	60 (4.3)	3.5 (1.5)	36.5 (4.5)	16.1 (3.3)	79.8 (3.2)	4.2 (1.8)	15.3 (3.5)	84 (3.6)	0.6 (0.6)	28.6 (4.1)	68.9 (4.2)	2.5 (1.2)
Tripura	21.4 (2.9)	11.3 (2.3)	67.3 (3.4)	39.3 (3.8)	42 (3.6)	18.7 (3.1)	37.5 (4)	49.4 (4.2)	13 (2.4)	44.9 (4)	32.3 (3.6)	22.8 (2.9)
Uttar Pradesh	39 (4.1)	7.5 (2.1)	53.5 (4.5)	20.3 (3.6)	70.3 (4.4)	9.4 (2.6)	36.7 (4.4)	54.1 (4.5)	9.2 (2.5)	40.6 (3.6)	28.5 (3.9)	30.9 (4.2)
Uttarakhand	29.2 (3.3)	18 (3)	52.8 (3.3)	33.7 (3.7)	56.7 (3.8)	9.6 (1.8)	35.6 (3.2)	54.4 (3.3)	10 (1.9)	56.2 (3.1)	18.5 (2.7)	25.3 (3)
West Bengal	14.1 (1.9)	31.6 (3.2)	54.2 (3.3)	26.2 (3.3)	10.1 (2.1)	63.7 (3.6)	38.7 (3.9)	28.5 (3.5)	32.8 (3.5)	48.3 (3.6)	19.3 (2.7)	32.4 (3.3)
Chandigarh	58 (5.9)	6.3 (3.3)	35.7 (5.4)	36.6 (5.7)	33.9 (6.6)	29.5 (5.3)	27.7 (5.3)	54.5 (6.5)	17.9 (5.3)	33 (4.1)	58.9 (4.4)	8 (2.4)
Puducherry	50 (6.2)	9.4 (3.3)	40.6 (5.8)	21.2 (3.7)	67.1 (4.5)	11.8 (3.2)	23.1 (4.6)	63.3 (5.2)	13.6 (4)	34.7 (4.6)	47.6 (5.3)	17.6 (4.4)
Daman & Diu	55.4 (7.7)	2 (1.4)	42.6 (7.1)	13.9 (4.5)	81.2 (5.9)	5 (3.3)	25 (7.1)	62 (6)	13 (4.9)	48 (7.3)	34 (6.6)	18 (5.2)
Overall average	**28.4 (0.7)**	**18.6 (0.6)**	**52.9 (0.7)**	**29.6 (0.7)**	**50.2 (0.7)**	**20.2 (0.6)**	**34.6 (0.6)**	**50.4 (0.6)**	**15 (0.6)**	**41.5 (0.8)**	**30.6 (0.6)**	**28 (0.5)**

Appendix - X

List of Surveyed States, Districts, Schools, Teachers, and Students

S. No.	State/ Union Territory	No. of selected district	District name	School	Teacher	Student
28	A & N Islands	2	Middle And North Andamans, South Andamans	86	257	2,461
1	Andhra Pradesh	11	Adilabad, Nizamabad, Karimnagar, Hyderabad, Mahbubnagar, Nalgonda, Warangal, Visakhapatnam, East Godavari, West Godavari, Anantapur	250	318	4,429
2	Assam	12	Dhubri, Goalpara, Bongaigaon, Kamrup, Nalbari, Darrang, Nagaon, Lakhimpur, Dhemaji, Dibrugarh, Cachar, Karimganj	294	590	5,536
3	Bihar	13	Pashchim Champaran, Madhubani, Purnia, Darbhanga, Muzaffarpur, Saran, Begusarai, Bhagalpur, Nalanda, Patna, Gaya, Nawada	224	420	3,997
29	Chandigarh	1	Chandigarh	59	113	2,479
4	Chhattisgarh	11	Furguja, Jashpur, Raigarh (Chhattisgarh), Janjgir – Champa, Bilaspur (Chhattisgarh), Rajnandgaon, Durg, Raipur, Mahasamund, Dhamtari, Baster	247	257	2,565
31	Daman & Diu	2	Daman, Diu	35	102	1,293
5	Delhi	7	North West Delhi, North East Delhi, East Delhi, Central Delhi, West Delhi, South West Delhi, South Delhi	139	148	3,864
6	Goa	2	North Goa, South Goa	55	105	1,443
7	Gujarat	11	Kachchh, Banas Kantha, Patan, Mahesana, Sabar Kantha, Ahmedabad, Junagadh, Bhavnagar, Anand, Kheda, Bharuch	212	362	5,621
8	Haryana	12	Yamunanagar, Kurukshetra, Sonepat, Jind, Fatehabad, Sirsa, Hisar, Bhiwani, Jhajjar, Mahendragarh, Faridabad, Palwal	239	241	4,889
9	Himachal Pradesh	9	Chamba, Kangra, Kullu, Mandi, Hamirpur, Una, Solan, Sirmaur, Shimla	248	329	3,844
10	Jammu and Kashmir	10	Kupwara, Baramulla, Pulwama, Anantnag, Doda, Udhampur, Punch, Rajauri Jammu, Leh (Ladakh)	400	651	4,306
11	Jharkhand	11	Hazaribag, Kodarma, Giridih, Deoghar, Sahibganj, Pakaur, Dhanbad, Bokaro, Ranchi, Pashchimi Singhbhum, Purbi Singhbhum	223	622	5,326
12	Karnataka	11	Belgaum, Bijapur, Gulbarga, Raichur, Haveri, Bellary, Kolar, Bangalore, Mandya, Dakshina Kannada, Chamrajnagar	248	406	5,397
13	Kerala	8	Kannur, Wayanad, Kozhikode, Malappuram, Palakkad, Thrissur, Ernakulam, Kollam	186	365	4,217
14	Madhya Pradesh	14	Morena, Bhind, Gwalior, Guna, Tikamgarh, Sagar, RewaSidhi, Mandsaur, Ujjain, Jhabua, Betul, Hoshangabad, Narsimhapur	258	324	2,711
15	Maharashtra	14	Nandurbar, Nagpur, Jalna, Aurangabad (Maharashtra), Nashik, Thane, Pune, Ahmadnagar, Bid, Osmanabad, Solapur, Ratnagiri, Kolhapur, Yavatmal	275	480	6,743
16	Meghalaya	5	East Garo Hills, West Khasi Hills, Ri Bhoi, East Khasi Hills, Jaintia Hills	246	479	3,812

17	Mizoram	5	Mamit, Aizamel, Champhai, Lawngilai, Saiha	174	520	2,941
18	Nagaland	8	MON, TUENSANG, Mokokchung, Zunheboto, Wokha, Dimapur, Kohima, Phek	104	295	1,578
19	Orissa	13	Keonjhar, Mayurbhanj, Balasore, Bhadrak, Jagatsinghapur, Cuttack, Angul, Khordha, Ganjam, Bolangir, Kalahandi, Rayagada, Malkangiri	266	416	2,665
30	Puducherry	2	Pondicherry, Karaikal	73	171	2,312
20	Punjab	11	Gurdaspur, Amritsar, Kapurthala, Jalandhar, Hoshiarpur, Nawanshahr, Ludhiana, Firozpur, Muktsar, Sangrur, Patiala	251	261	3,963
21	Rajasthan	11	Hanumangarh, Jhunjhunu, Karauli, Dausa, Jaipur, Nagaur, Jodhpur, Barmer, Jalor, Pali, Bhilwara	268	290	3,539
22	Sikkim	4	West Sikkim (Geyzing), East Sikkim, South Sikkim, North Sikkim (Mangan)	133	263	3,343
23	Tamil Nadu	11	Chennai, Kanchipuram, Vellore, Thiruvannamalai, Vilappuram, Salem, Coimbatore, Tiruchirappalli, Ramanthapuram, Thoothukudi, Kanniyakumari	230	324	5,836
24	Tripura	4	West Tripura, South Tripura, East Tripura (Dhalai), North Tripura	196	392	2,768
25	Uttar Pradesh	16	Moradabad, Rampur, Meerut, Ghaziabad, Aligarh, Etah, Bareilly, Sitapur, Etawah, Kanpur Nagar, Allahabad, Bahraich, Basti, Kushinagar, Ballia, Varanasi	241	326	4,789
26	Uttarakhand	9	Chamoli, Tehri Garhwal, Dehradun, Garhwal, Pithoragarh, Almora, Champawat, Nainital, Haridwar	296	463	4,285
27	West Bengal	11	Jalpaiguri Cooch Bihar, Murshidabad,Barddhaman,North Twenty Four Parganas, Hoogly, Purulia, Howrah, Kolkata,South Twenty Four Parganas, Paschim Medinipur	255	561	4,701
	Total	**271**		**6,411**	**10,851**	**1,17,653**

List of State Coordinators and Associate Coordinators

S. No	State	Coordinator	Associate Coordinator
1.	Andhra Pradesh	Director, SCERT, Hyderabad Andhra Pradesh	Dr. S. Vijay Kumar SCERT, Hyderabad, Andhra Pradesh
2.	Assam	Director, SCERT Gauhati, Assam	Mr. Laxmikamt Das SCERT, Assam
4.	Bihar	Director, SCERT Mahendru, Patna, Bihar	Dr. Syed Abdul Moin Head, Technical Education, SCERT, Bihar
5.	Chhattisgarh	Director, SCERT, and State Project Officer, Rajiv Gandhi Shiksha Mission, Raipur	Ms. Archana Verulkar SCERT, Sankar Nagar, Raipur, chhattisgarh
6.	Delhi	Dr. V.P. Singh SPD, SPD Office Road, U.E Mission	
7.	Goa	Director, SCERT Panaji, Goa.	Dr. Richard Kalbarl SCERT, Goa
8.	Gujarat	Director, GCERT Gandhinagar, Gujarat	Dr. Bhaumik Trivedi GCERT
9.	Haryana	Director SCERT, Gurgaon, Haryana	Dr. Yogesh Vasishtha SCERT, Gurgaon, Haryana

10.	Himachal Pradesh	Principal, SIE Himachal Pradesh Primary Education Society, Shimla-171001	Mr. Shiv Kumar Sharma Sr. Lecturer, SIE, Himachal Pradesh
11.	Jammu & Kashmir	Principal, State Institute of Education, Jammu. Principal, State Institute of Education, Srinagar	Mr. A.R. Bhatt, SIE, Srinagar
12.	Jharkhand	Director, Elementary & Secondary Education, HRD JEPC, New Cooperative Building Shyamli Colony, Ranchi-834002	Dr. Pramod Kumar Sinha Jharkhand Education Project Council, Shyamali Colony, Doranda, Ranchi
13.	Karnataka	Director, DSERT No.8, KSCMF Building, MSB, 3rd Block, 2nd Floor Cunningham Road, Bangalore-560052	Ms. A. Subhadra DSERT No.8, KSCMF Building, MSB, 3rd Block, 2nd Floor Cunningham Road, Bangalore-560052
14.	Kerala	Director, SCERT Thiruvananathapuram Kerala	Mr. C. Gokul Dasan Pillai Head Curriculum , SCERT, Poojappura, Thiruvananthapuram, Kerela
15.	Madhya Pradesh	Director, State Education Centre Pustak Bhawan, B-Wing, TBC Arera Hills, Bhopal	Mr. P.L. Dongre SCERT, Arera Hills, Bhopal-462021
16.	Maharashtra	Director, MSCERT 708, Sadashiv Kumtekar Marg Pune-411 030	Shri K.D. Panage MSCERT Pune, Maharashtra
17.	Manipur	Secretary, Board of Secondary Education Manipur	Mr. S. Mangi Singh Mr. S. Jitelal Sharma Under Secretary , Board of Secondary Education, Manipur
18.	Meghalaya	Director Directorate of Educational Research and Training Shillong-793 011, Meghalaya	Mr. P.B. Lartang, Sr. Lecturer, DERT, Shillong
19.	Mizoram	Ms. Sangthanmawii Joint Director School Education & SCERT Aizawal, Mizoram	Ms. D. Ramdinthangi SCERT, Aizawal, Mizoram
20.	Nagaland	Director , SCERT Nagaland, Kohima	Mr. Daniel Thong Seb Lecturer, SCERT, Kohima, Nagaland-797001.
21.	Orissa	Director, SCERT Bhubaneswar, Orissa	Dr. Trllotama Senapapi, Assistant Director, SCERT, Orissa Dr. Namita Chhotroy, Coordinator SCERT, Bhubaneshwar.
22.	Punjab	Director, SCERT Punjab, Chandigarh	Mr. Jagtar Singh SCERT, Punjab, Chandigarh.
23.	Rajasthan	Director, SCERT Udaipur, Rajasthan	Mr. Aditya Mishra, Assistant Director, SCERT, Udaipur, Rajasthan.
24.	Sikkim	Dr. (Mrs.) Indira Joshi, Joint Director, SCERT, Sikkim	Mr. Suraj Bir Singh SCERT, Sikkim
25.	Tamil Nadu	Dr. R. Elangovan, Director, DTERT Tamil Nadu Chennai	Dr. L. Radha Asst. Professor, DTERT

26.	Tripura	Director, SCERT Agartala–799 005, Tripura	Mr. Nilkanta Singha SCERT, Agartala, Tripura.
27.	Uttar Pradesh	Principal, SIE, Allahabad, U.P	Mr. Sanjay Yadav Ms. Mamta Dubey SIE, Allahabad, U.P
28.	Uttarakhand	Director, SCERT, Tehri Garhwal, Uttarakhand	Dr. D.S Lingual SCERT, Narendra Nagar, Tehri Garhwal, Uttarakhand.
29.	West Bengal	Dr. R.N. De, Director, SCERT 28/3, Ballygunj Circular Road, Kolkata –700019 (West Bengal)	Mr. Subrat Kumar Biswas Mr. Gautam Bhattacharya SCERT (WB), 25/3, Ballygunj Circular Rd., Kolkata, West Bengal.
30.	Andaman & Nicobar Islands	Dr. R. Devdas, Principal, SIE, Port Blair Andaman & Nicobar Islands	Dr. M. Ayyaraju, Assistant Director of Education (Monitoring), State Project Officer, SSA, Port Blair, Andaman & Nicobar Islands.
31.	Chandigarh	Dr. S.S. Dahiya, Director, SIE Chandigarh	Dr. Savita Sridhar Lecturer, SIE, Chandigarh.
32.	Puducherry	Director of School Education, Puducherry Puducherry–605 008	Mr. R. Valavan Principal, Dist. Institute of Education and Training, Puducherry–605 008.

WHAT ARE NATIONAL ACHIEVEMENT SURVEYS?

National achievement surveys are large-scale assessment exercises designed to determine educational standards across the country.

They use a representative sample of students and must be carefully designed to fit the group being assessed.

National achievement surveys are not examinations. They check the general health of the education system: they don't test individual students!

The main purposes of large-scale education assessments are:

- to measure typical levels of achievement – i.e. find out what students achieve in key subjects

- to make comparisons – e.g. between girls and boys, among states etc.

- to monitor trends over time – i.e. track progress

- to investigate background factors that may affect educational outcomes – e.g. home context and school environment.